



PHILOSOPHICAL SURVEY
OF THE
ANIMAL CREATION.





ANIMAL CREATION

235644

A
PHILOSOPHICAL SURVEY
OF THE
ANIMAL CREATION,
AN ESSAY.

WHEREIN

The general Devastation and Carnage that reign among the different Classes of Animals are considered in a new Point of View; and the vast Increase of Life and Enjoyment derived to the Whole from this Institution of Nature is clearly demonstrated.

Translated from the FRENCH.

All Discord Harmony, rightly understood;
All partial Evil universal Good.

POPE.

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Y A S S E H A



I have to the pleasure and
 honor of all the powers of
 nature and of the immortal
 spirits of the departed, and
 of the living, and of the
 departed, and of the living,

P R E F A C E.

 **NOTHING** contributes so much to the welfare of men, as the progress they make in the study of nature. Other researches may serve to amuse, but those which have for their object the actual state of things, their properties, tendency, order, and connection, besides the amusement they afford, lay a foundation for very useful discoveries relative to the necessities and conveniences of life.—As all the powers of nature are subject to fixt, immutable laws, and necessarily produce their effects, they must of consequence con-

PREFACE

tribute to the happiness of men, wherever men have skill enough to direct them to such an end; this they are taught to a certain degree by the study of nature. And accordingly we find that in proportion to the proficiency they have made in this study, mankind have abridged the miseries of life, and multiplied the means of providing for a comfortable subsistence. — There is another advantage also derived from this study, not inferior to the preceding. By discovering the connection that necessarily subsists betwixt the different classes of beings, and the general laws by which they all conspire to one principal end, it conveys those enlarged conceptions to the understanding which alone can enable us to form just ideas of the Deity. By fixing the attention upon things as they actually exist,
and

P R E F A C E vii

and upon those alone, it inspires an invariable love of truth, which is only to be acquired by the contemplation of her, and which is the only effectual barrier against those floods of error that universally deluge the human understanding. From hence arises also in the mind a certain confidence in the plan of nature; for in proportion as the natural causes of things and of events unvail themselves to our eyes, the phantoms of our imagination vanish. We behold only one self-existent Being, animating and governing the system of the world, and who unites to infinite power, those transcendently amiable attributes, wisdom and goodness; not a partial and capricious goodness, but a beneficence that pours forth its blessings in every age, and in every place. The rule of his dispensations is the felicity of

the universe; the limits of them—
eternity.

Without some degree of acquaintance with the operations of nature, we are apt to be continually alarmed at the appearances they produce. A number of unexpected phenomena, which threaten immediate destruction to the world, suggest every moment to the mind, the ideas of an incensed Deity, who must be appeased at all events. This has given rise to the most ridiculous practices; for when our judgments are under the influence of fear alone, there is no absurdity too great for us to commit. And indeed what can be a greater absurdity than to dread the Supreme Being as an austere master, who exacts of his creatures services beyond their strength, and yet, upon this account

P R E F A C E ix

count is continually dissatisfied with those which they offer him: or to associate with him in the government of the world, a multitude of agents, whose only pleasure and only employment it is to trouble the repose of mortals. And yet such are the sentiments of those, who, through an ignorance of the powers with which infinite wisdom has animated second causes, regard every extraordinary effect produced by them, as so many adverse strokes, inflicted by some invisible hand, jealous of our happiness. Their minds, who consider every thing as ominous, being agitated with continual fears, are always prepared to submit to the servile yoke of falsehood and imposture. Religion, naturally the source of tranquillity and joy, becomes to such the perpetual source of alarms and inquietude. Ignorance

x **P R E F A C E**

ignorance is the parent of superstition; and superstition renders men the most feeble, and the most ridiculous of beings.

The study of nature, therefore, cannot be too strongly enforced upon men. From hence it is that we learn to acknowledge a Providence, and to consider every event as the necessary consequence of the laws she has established, to maintain the order of the universe, and unite together its various parts. And we accordingly find that these studies have, in every age, engaged the attention of philosophers; whereas those who are no philosophers have perpetually run after shadows, thought that they saw when they saw not; that they heard when they heard not, and that they know a great deal when they know nothing; or, which amounts

P R E F A C E iii

mounts to the same, when all their knowledge consisted in certain dreams, of which they were very tenacious, though it were better they had been forgot.

There can be no genuine knowledge, or worthy our pursuits, that is not founded upon a just conception of things; and this can only be obtained by an inquiry into the truth of things. Numbers, however, instead of observing these rules of acquiring knowledge, have invented principles, and adopted hypotheses, by which they pretend to judge of every thing, without taking the trouble to examine the minutest as it is in itself, that is, by the senses and experiments. By these means the world (the creatures it contains) have taken in their conceptions quite in a different

different form and destination to what God has in reality given them; and it is this imaginary system that they make the object of their study and contemplation: it is here that they spin at leisure their curious observations: it is from hence they draw their discoveries, their conjectures, their probabilities, and the whole parade of their knowledge. While others again, still more infatuated, collect with care all these chimerical notions, and incessantly labour to make them harmonize, I say not with facts, but with other ideas full as chimerical.

When nature is the object of our attention, the principles we have just laid down, are the only rules that can lead us into an acquaintance with things as they actually exist. And it is a happiness that men have begun

P R E F A C E. xiii

at length to perceive their importance, and require their evidence before they will pass a verdict. The hypothetical gentry begin to be disregarded: their writings, like a solitary wreck which the mariner descries upon some distant shoal, serve only to admonish us, this is not the course you are to steer, if you would arrive at the desired haven.

Nature presents to our minds an infinite variety of objects, all of which are equally calculated to amuse and instruct. But what strikes us the most is that immense quantity of life with which the whole creation swarms. What an innumerable multitude of beings share with us the privilege of life, sensation, and enjoyment, and are equally, with ourselves, under the protection of an attentive Providence.

How

xiv P R E F A C E

How various their shapes and figures! How different their instincts! What fire in their temperaments, what life in their gait, and agility in all their movements! And yet what an insatiable thirst to destroy each other! Various are their changes, numerous their revolutions, but what a just proportion and uniformity is still preserved in their numbers! Animal life may, in some respects, be compared to a fire, which consumes, but does not extinguish itself: like the Hydra or Vertumnus in the fable, it divests itself of one form only to assume another. In other respects it resembles a rude torrent that rolls headlong from a lofty mountain, and though it falls into its proper channel, yet it is restless and turbulent, till it has acquired an equality with itself. These appearances certainly merit the attention of

P R E F A C E

a studious mind: and he that carefully examines the reasons, will discover light dawning upon the whole plan of creation. The beautiful labyrinth of nature will present, at every turn, such openings to his admiring eyes, as shall convince him of the existence of a Being infinite in wisdom and in power.

These different phenomena in animal life have for some time employed our studies, and we have attempted to discover those marks of order and wisdom which characterize the productions of Omnipotence; and whatever others may alledge, we have found that they are not altogether beyond the ken of human intelligence. With respect to the opposition that reigns betwixt creatures of different species, Mons. Buffon, and other naturalists

xvi P R E F A C E.

turalists, have already remarked, that it was productive of consequences equally just and useful. But they have only pointed out the truth; we shall venture to carry our thoughts upon this important subject somewhat further; and shall attempt, at the same time, to elucidate some other properties of the animal system. It is our ambition to encourage and assist the inquisitive, to advance one step more in the knowledge of the truth. Such a design will surely secure their attention; and we flatter ourselves that the manner in which it is executed, will not render us unworthy of it. We have not any recent discoveries in natural history to communicate: those that we shall recite are universally known; yet the point of view in which we shall place them, will, perhaps, appear new to every one. The great
variety

PREFACE xvii

variety of forms and species which reigns throughout the animal system, is for example obvious to all; yet they are ignorant of the purposes to be answered by it. It is generally imagined, that the perfection of our system consists in a certain chain which unites, by imperceptible gradations, the lowest species to the most exalted; and to the meer structure of this chain has the whole plan of Providence been confined. But we shall see that its designs are much more noble and beneficent—Women and children can tell us, that animals are subject to accidents, that they produce, and devour one another; yet few philosophers know that there is an intimate and indispensable connection betwixt these; and that without their union animal life, and of consequence enjoyment, could not take place: and

as some of them glory in their ignorance in this respect, and take occasion from hence to ridicule the belief of a being supremely good and wise, who presides over the government of this world; it cannot be improper to enter into some particulars upon the subject. This Essay at least may serve as an introduction for those who intend to make natural history their study. They will here see all the different species of animals assembled as it were in one point of view; and they will learn to refer the nature, and different properties of each to general ends, productive of the good of the whole.

We shall divide the subject into three parts. In the first we shall treat of the nature of life in general, its ends, extent, and variety. In the second,

P R E F A C E. xix

cond, we shall consider the opposition in which it is with itself, and the advantages of this opposition. And in the third, after we have answered the objections which may be made to our theory, we shall treat of the law of multiplication, its origin, and effects.

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...in which it is with ...
...the advantages of this ...
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T. H. H.

22

THE
CONTENTS.

PART THE FIRST.

SECTION I.

Observations concerning the Nature of Animal Life. Page 1

SECTION II.

Life is the grand Design of the Creation. 8

SECTION III.

Of the Quantity of Life on the Earth. 12

SECTION IV.

Of the Variety observable in Animal Life. 20

SECTION V.

Of the Beauty observable in the Structure of Animals. 29

PART

xxii CONTENTS.

PART THE SECOND.

SECT. I.

Of the perpetual Opposition that subsists betwixt Animals of a different Race. Page 40

SECT. II.

The Devestation which takes place in Animal Life, contributes to its Re-production and Well-being. 45

SECT. III.

The first Proposition proved. 46

SECT. IV.

The second Proposition proved. 64

SECT. V.

Of the Law which enjoins the Multiplication of Animals, and of its Effects. 72

SECT. VI.

Of the Consequences which necessarily result from the Law of Multiplication. 81

SECT.

CONTENTS. xxiii

SECT. VII.

Of the different Effects produced by the Increase of the human Species, according to the particular circumstances of their Situation.

Page 84

SECT. VIII.

Of the coercive Powers necessary to every Species.

97

SECT. IX.

Of the Equilibrium established by Nature betwixt the different Species in the Animal System.

103

SECT. X.

Of the Obstacles which oppose the Excess of Population in the Human Species.

105

SECT. XI.

Particular Instances given of this coercive Power in the Animal System.

123

PART

CONTENTS

PART THE THIRD.

SECT. I.

*The World is governed by general Laws.
The Nature of these Laws. Page 136*

SECT. II.

*Nature is not chargeable with Cruelty in the
Wars she excites amongst Animals. 144*

SECT. III.

*The Law of Multiplication is absolutely
necessary in the Animal System. 149*

SECT. IV.

*Advantages resulting from the Law of Mul-
tiplication. 156*

SECT. V.

*General Reflections upon what has been ad-
vanced. 159*

PART

PART THE FIRST.

SECTION I.

*Observations concerning the Nature of
Animal Life.*

IT is difficult to determine the nature of animal life. This is manifest however, that it cannot exist without certain organized parts, and that it possesses greater degrees of vigor, in proportion as this organization is compleat. By attentively examining animal substances we shall learn, that they do not consist of a confus'd mass of materials heaped together, without choice and without distinc-

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tion;

tion; but that they form, throughout their whole extent, an assemblage of parts exquisitely finished and wonderfully combined, so as to constitute a complete whole. They are divided into solids and fluids. The solids comprehend the nerves, arteries, veins, muscles, tendons, cartilages, glands, intestines, or in a word the flesh and bones. Amongst the fluids are consider'd the chyle, blood, lymph, bile, animal spirits, and a variety of other humors, contained in the substance of the glands. These different parts of animated bodies are destined to some particular use. They possess the precise configuration, size, weight, flexibility, and in short all the qualities requisite for their destination. None of them exist independent of the rest, but they have all an intimate connection with each other, and preserve themselves in perpetual motion by maintaining their due balance, and reciprocal action. The solids, continually contracting and dilating promote

the circulation of the blood through all parts of the body. The fluids, after they have passed thro' their fermentation, and been filtrated through the glands of the brain, are returned by means of the nerves to the solids, and communicate to them their proper powers of motion.

We have asserted that the life of animated bodies, possesses greater degrees of force and perfection in proportion as their organization is compleat. And we find in fact that an equal share of vivacity and fire is not conferred indiscriminately upon all the different species, but that those enjoy the greater portion whose organs are the most delicate, mobile and complicate. We find, that life in individuals of the same species, becomes more or less sportive and vigorous, according as their organs are in a state of development or of decay. How great the difference in this respect betwixt

the foetus, and an animal arrived to full maturity! And we find further, that whenever any of the principal organs are out of order, by which their proper action is suspended, a cessation of life immediately ensues.

This close harmony between the life and organization of bodies, has induced some philosophers (*a*) to imagine, that life is no other than a certain combination of organs, which are kept in a perpetual motion by mutually acting upon each other.

But this sentiment seems to confound life with motion; two things which are very distinct in the ideas of every man, as indeed they are in themselves. The motion of a body, let it be what kind of motion you please, will have no effect upon the nature and properties of that

(*a*) See the philosophical Works of Le Clerc. Tom. iv.

body : it merely changes its position relative to another body : and there is an immense difference betwixt this idea and the idea of sensibility, which constitutes one of the most essential qualities of animal life. We must therefore seek the principle of its existence elsewhere. Some have placed it in the heat which is universally communicated to animal bodies. Mr. Buffon supposes that there are organized and living molecules, which continually pass from one body to another, and which, according to him, constitute the incorruptible germe of animal life. Could conjectures satisfy us we should not hesitate to place it in the rank of elements ; and we might observe, that, considering it as a substance, it has a strong resemblance to fire. Should any one ask, in what this resemblance consists, I could answer, that as fire is kindled by fire, thus does life generate life : that weak and wavering in its rise, active and impetuous in the midst of its career, lan-

guid and exhausted at the close, the progress of a living is exactly similar to that of an *inflamed* substance: this at first is but a spark, a glimmering light, scarce able to support itself; by spreading, it changes into an impetuous flame, and after having surprized us with its lustre, it is spent and extinguished of itself: we might add, that as inflammable substances require a perpetual supply of fuel, thus the living substance cannot subsist without constant supplies of nourishment: that as fire seizes and consumes whatever is its proper aliment, thus does animal life fix upon and devour whatever affords it sustenance: that as fire may be extinguished by too large a quantity of combustible materials, as well as by the want of them, thus may a superfluous quantity, as well as a deficiency of food, prove equally prejudicial to life: that those materials which produce the most violent effects upon living bodies, (as certain spirits for example)

have

have precisely the same influence upon inflamed ones: that each require air for their support, and that air which has already passed through the fire, and thereby lost its nutritive salts, is equally pernicious to both. In a word, we might remark, that it is only by the kindly influence of heat that a living body experiences the first expansion of its germe; it is this which rears it to its summit of perfection, and after having introduced them into being, it acts the part of a nurse and physician to animated bodies, in preserving the requisite flexibility of their fibres, and motion of their fluids.

If, I say, we could content ourselves with conjectures, we might call life an element, and as such compare it with fire: but this is by no means our design; we propose to reason from propositions capable of a much stronger degree of evidence.

S E C T. II.

Life is the grand Design of the Creation.

WHATEVER may constitute the living principle of animals, it is clearly manifest that the production of life is the most noble effort of omnipotence, and the center in which all its other operations terminate. To create meer inanimate beings, is unworthy of a Deity. As matter is incapable of life, the existence of such beings, does not reflect the least idea of perfection in the supremely intelligent mind. Neither is there any increase of happiness derived to others from hence; and it is an absurdity to imagine that a Being, completely happy in himself, should act from any other motive. God has therefore peopled the universe with inhabitants; and the inanimate parts of which it is

com-

composed, exist for no other end than to prove conducive to the conservation of the animate. Nor is the air, earth, and seas alone subservient to this purpose, but the celestial bodies, also; not only the celestial bodies which compose our system, but the whole constellation that glitters in the firmament.

Though we speak in this language we do not forget that the ways of providence are incomprehensible; but we imagine that this incomprehensibility is confined to the means employed for the accomplishment of her designs; as to these designs themselves, it appears to us with all the force of demonstration, that they immediately relate to the production and conservation of the greatest possible good in the universe; and that he who supposes any other, entertains ideas utterly unworthy of them.

Some imagine that every thing in the creation

creation has an ultimate reference to man, and that God exerts his plastic power for man alone. But such notions ought not to be retained, without retaining the curious system that gave them birth. They might pass when men, even the wisest of them, were weak enough to believe that the earth was an immense plain, situated in the centre of the universe; that the vault of heaven was of chrysal; that the sun was no other than a plate of red hot iron, about as large as the Peloponnesus; but as human nature now blushes at these errors, she ought to blush a deeper dye at ingrossing the whole plan of providence to herself. Will any one assert that the universe exists, merely for the contemplation of superior intelligences? But what ideas must we form of the supreme Being, to imagine that he exhibits the wonders of his power, only to divert some of his creatures? And what conceptions must we entertain of these intelligent beings themselves,

selves, to suppose that they can contemplate with any degree of pleasure works, which, though great and marvellous, are still barren and futile, while they might have been the seat of life and happiness.

There is no doubt therefore but that life is the principal design of the creation, and of consequence there must be, as the wisest philosophers have imagined, a plurality of worlds. The fixed stars are as so many suns, which, with the bodies they illuminate and preserve in their orbits, form so many systems, similar to that of which our world is a part. And let any one reflect upon the number of these stars, the multitudes that are visible to our eyes, the multitudes that are invisible: let him ascribe to each of them a certain number of planets, to these planets, Satellites, and to all these bodies, inhabitants in proportion to their size, and then calculate if he is able the quantity of life which the universe contains:

LOUIS

S E C T.

S E C T. III.

Of the Quantity of Life on the Earth.

PROVIDENCE seems to have advanced to the utmost verge of possibility in the gift of life conferred upon animated beings. That plenitude of existence which is observable upon the earth, sufficiently confirms this opinion, for it every where appears with a most astonishing profusion. The human race which occupies such a wide extent, and is divided into so many different nations; the human race I say constitutes but a part of the inhabitants destined to people our globe. Nor is it the most considerable part. There are species more numerous than ours. This appears to be the case with those insects whose immense swarms seem to convert the elements they inhabit into one con-

S E C T.

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tinued web of life, and in whose nature the vital fire burns with no less vigor than in our own. Some naturalists have attempted to enumerate the different species that inhabit the earth. But their calculation, suppose it just, must be confined to certain countries, or at most to those animals which are obvious to our sight; for what numbers are there, which either from their extreme minuteness, or the places they inhabit, elude our inspection! Let it suffice to observe that there is not a spot, however remote, or bad its situation, whether in the extremes of heat or cold, dryness or humidity, that is without inhabitants; and those places which are the least accessible to the human species, possess perhaps the greatest abundance. There are countries, where the vital substance fermenting as it were into life by the heat of the sun, breaks forth precipitately from its matrix and spreads with a kind of fury over the whole land.—There are countries where
 slow the

the earth is totally covered with reptiles, where the air is obscured with innumerable multitudes of winged insects. The confused cries of an immense assemblage of animals of different species, the lustre of their attire, and their perpetual agitation, seem to have metamorphosed extensive forests into one animated mass. In a word, there are countries where men, and the animals destined to their use, appear superfluous, through that immense quantity of life which the earth otherwise supports. The inhabitants of Carthago are obliged to defend themselves every moment against the attacks of a multitude of reptiles and insects. Amongst these are the Moschetos, and Culebrillo, which lodge in their skin, and occasion ulcers and sometimes gangrenes. The horses and wild asses have their feet painted red, as it were, with these cruel insects. At Porto-Bello, such an astonishing quantity of large toads come out of the woods after a shower of rain, that it is impossible to walk

walk without trampling upon some of these animals, and exposing yourself to their venomous bite. At Guyaquil, the houses are filled with Snakes, Vipers, Scorpions, and Scolopanders, which creep into every part. It is dangerous for the inhabitants to go to rest, without first examining their beds, and screening themselves with some kind of canopy or tent. The air likewise in these places is so infested with volatile insects, that it is impossible to keep a candle lighted for the space of three minutes; or to approach it while burning, without having your eyes, nostrils, mouth and ears, immediately filled with swarms of them. We were greatly harassed, says Don Uloa, whilst we were in this city, in making our observations upon the heavenly bodies by night: for on one side, we were exposed to the stings of a multitude of insects; and on the other, we could scarcely see or breathe on account of them. So great is the abundance of life which the warmer

warmer climates produce! And although there are fewer inhabitants in the colder regions, yet we may assert, that they are in proportion to the quantity of nourishment the earth affords: and that this quantity is more or less abundant, according to their situation, and the degrees of heat to which they are exposed. But since it is impossible that all parts of the globe should have precisely the same position, and as every part has such a position as is best calculated to produce the greatest quantity of life possible, we may assert, that if the absolute number of inhabitants is not so great as it might have been, it is nevertheless always approaching towards its plenitude. Suppose that the ecliptic made with the equinoctial line an angle of 43 degrees, instead of 23, three parts of the globe would be uninhabitable: for the tropics, considering them in the same situation as they are at present, would then experience in the space of a year, all the heat of the torrid zone, and

all

all the cold of the frigid: but there is no plant or animal that could sustain these two extremes. Was the plain of the ecliptic the same as the equator, or were they parallel, it is again manifest that the greatest part of the globe would be destitute of summer, consequently of harvest; or, which returns to the same thing, without inhabitants.

We acknowledge that there are deserts; but who will assure us that these are not to the habitable parts, the same as openings and squares are to large cities; that are designed to preserve the air in a state of purity, which it must doubtless lose, was every part to be equally inhabited? Or, who will assure us, that they are totally destitute of inhabitants; since a celebrated naturalist relates, that having minutely examined the sand in the deserts of Egypt, he discovered several of the known species of insects, and others hitherto un-

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known? But supposing them destitute, it is extremely probable that those vast beds of sand, which extend themselves from the further extremities of Africa to the centre of Asia, have still their utility with respect to life; either by forming voids, where the atmosphere may recover its elasticity, and other qualities it might have lost, were every part equally full of life; or by being necessary to reflect with greater lustre the light destined to illuminate the world. It is true also, that there are large tracts of land which lie uncultivated; but we are not to imagine that agriculture universally contributes to the increase of existence. There are some countries, where it is at least doubtful, whether it does not lessen the quantity. Those for example, that abound with a kind of insect, which agriculture requires to be destroyed; and which, in fact, is extirpated by the frequent tillage of the soil. For one species, to which the cultivation
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of some of the forests in America might be favourable, there are ten, perhaps, to which it would prove fatal.

The world, we say, contains an immense quantity of living creatures, and it appears from experiment, that notwithstanding the innumerable multitude of those that present themselves to our sight, we see but a part, and that a very small part of the animal creation. When we examine nature through the microscope, what an astonishing spectacle! Life issues with profusion from the smallest objects! A blade of grass, a drop of the purest water, contain thousands of millions of beings that are furnished with organs, that live, move, and speak amongst themselves! And if we examine into their origin, it appears without a doubt, that they proceed from an innumerable multitude of insects floating in the air, so that we have the greatest reason to believe that the whole atmosphere is impregnated with life.

This astonishing extent of animal life doubtless, requires for its production, and still more for its conservation, an infinitude of arrangements, combinations, and resources; and Providence has accordingly made particular provision for each. This is another mark, by which we may know the true and only design of the creation.

those that present themselves to our inspection we consider a part, and that a very small part of the whole. When we

SECTION IV.

examine nature through the microscope,

Of the Variety observable in Animal Life.

with provision for the smallest objects.

PERMIT us here to scrutinize the conduct of the most High, by the

light of impartial and uncorrupted reason.

Reason is an emanation from his wisdom,

and we clearly see that he has followed

its decisions in the creation of his works.

This is a light which cannot prove fallacious.

Whatever true reason represents

to us as just, wise, and rational, must be so.

Let us then enquire what it was pre-

viously

visibly necessary for sovereign power to effect, in order to replenish the earth with that multitude of inhabitants it contains; or rather to cover it, as it were, with a living substance.

1. As the fruits of the earth are the basis of this substance, it was first necessary that the earth should produce them in immense quantities; and as there is an infinite variety in climates, seasons and soils, it was necessary to give a correspondent variety to the plants and trees destined to produce these fruits; that they might be suitable to every season, every latitude of the globe, and every kind of soil; and that mountains, sand, and rocks might be crowned with verdure, as well as the most fertile vallies and plains.

2. Plants and trees being thus varied, it was necessary to introduce all possible variety in the animal creation also. It is generally imagined, that the variety

in plants is subordinate to that observable in animals. But this supposition is erroneous: For as the design of Providence was to fill the world with living creatures, and as every soil is not equally proper for the production of all kinds of plants, it is much more natural to imagine, that the diversity of soils determines that of plants, and the diversity of plants that of animals. And we find accordingly, that in the order of creation, as related by Moses, the earth, and its different appearances, occupy the first place; then follow the plants and herbs bearing seed; and last of all, the different classes of animals.

The plants and trees being divided into so many different species, it was necessary, we say, to introduce all the variety possible into the animal system. It was requisite that there should be a winged species capable of rapidly transporting themselves from one place to another, and frequenting the most distant or most

elevated parts of the globe. It was requisite that there should be reptiles, which sliding along the surface of the earth, might absorb that portion of nourishment that would have been inaccessible to any other species. It was necessary that there should be quadrupeds, to consume the stalks and leaves of plants, while some other species gathered the seeds. In a word, it was necessary that there should be various classes of animals, and that each class should be subdivided into a multitude of species of different forms and size; in order that every part of the globe might be inhabited, frequented, and foraged by one race of creatures or another, and that all the fruits it produces might be converted into animal life.

Let any one now examine the real state of things in the world, he will find that this is precisely the plan that Omnipotence has followed. It must be immediately acknowledged, that he has given an infi-

nite diversity to plants. Where is the country so abandoned by nature, as to be totally barren of productions? What season of the year is without its fruits? Where the spot of ground so small, as not to demonstrate the extent of the plastic power of nature? Amidst the thousands of millions of blades which compose the moss of the fields, how few that perfectly resemble each other? And as to animals, their variety exceeds all conception. It is infinite with respect to their figure, their form, their dispositions, their manner of living. From the Ciron, (hand-worms) to the elephant, there is an imperceptible gradation in the size of animals, and each gradation is composed of a multiplicity of species, all of which differ in their motions, and are furnished with different arms. In each gradation, there are terrine and aquatic animals, and those which fly or skim along the air. — There is the frugivorous race, the carnivorous, and the mixt. Nor are

there any whose shape and make is not particularly adapted to the place they are destined to inhabit, and the kind of life they are to follow.——All are endowed with some particular talents; and those that have the same qualities, differ notwithstanding in the manner of possessing them. Is strength or agility the characteristic of an animal? In one it is seated in the ribs, in another in the vertebrae, in one the wings, another the hams, in one the neck, and in another the jaws. Some again are distinguished by the exquisite delicacy of the senses; but in this animal it is centered in the sight; in another, the hearing; in a third, the smell; and in a fourth, all the senses seem to be concentered in the feeling. All have received from nature a certain number of organs, which are the same as to their use; though they are infinitely various in their form and disposition. How great the difference, for example, in the arrangement of the brain and nerves of birds and

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quadrupeds ! betwixt the structure of the lungs in the terrene and aquatic race ! The intestines of bipeds and quadrupeds are composed of distinct pieces, all of which have their particular shape and mould. In reptiles and insects, it is one entire bag or canal, that commencing from the head, terminates at the tail. In the testaceous race, that cling to rocks and rugged parts of the earth, the bones cover the flesh : whereas in every other species, the flesh envelopes the bones. But that part of animals where the greatest variety is observable, is the organ which serves to gather their food. Here every animal receives a different mould, according to the element he inhabits. Those that live upon the earth and in the waters, and those which frequent the air, have each of them this organ differently formed. These general forms are again diversified in every species, according to the place they frequent, and the food by which they are supported. It is by this that the frugivo-

rous

tous animals are distinguished from the carnivorous; not only amongst the quadrupeds, but also in birds and fish: not only amongst animals visible to the naked eye, but those which the microscope discovers. What an apparatus of saws, leavers, pinchers, hammers, and other offensive weapons, are observable in the forehead of some animalcules, while that of others again is perfectly smooth. By this organ also are the species that live upon the roots of plants, distinguished from these that browse the tender herb. The quadrupeds of the first class are formed with the snout long and thin, the nose hard, and turned upwards; the lower range of teeth projecting beyond the upper; the lips tightly stretched, and close bound upon the jaw bone. Those of the second class, on the contrary, have their lips large, and extremely voluble; the muzzle flat and wide, the teeth uniform and close. So true is our assertion, that

the variety observable in the animal world, is subordinate to that of the vegetative.

To consider these varieties merely as the sports of fancy in the Almighty, or as the caprices of a Being that amuses himself with the ostentation of his wisdom, is to have studied the nature and perfections of the great Architect of the universe, in certain systems of divinity only. It is to form ideas utterly unworthy of him. This infinite diversity observable in animal nature, is a wise dispensation of that sovereign goodness which said to all the inhabitants of the earth, *increase and multiply*: for by these means it is that they are capacitated to spread over its whole surface, and convert into life all those vital juices which the earth contains. As they are divided into so many species, and as each species is furnished with some particular armour, there is no dense too

narrow, for animated beings to pass, and no lodgment which they cannot take, and no stores that do not lie at their mercy.

SECT. V.

Of the Beauty observable in the Structure of Animals.

WE shall, doubtless, be reminded, that notwithstanding the variety of forms apparent, both in the animal and vegetable world, there are none irregular in their structure, none destitute of beauty and grace. But every attentive observer will find, that with regard to these qualities themselves, the Almighty has had the increase and happiness of the animal creation more immediately in his view, than any other design whatever. And in fact, what is beauty but a necessary result of the aptitude of these forms to the offices for which they were designed?

From

From the assemblage of flowers, leaves, branches, shoots, and trunks; from the particular configuration of each of these parts, their proportions and regular arrangement, there undoubtedly results great beauty in the structure of trees and plants: but from hence arises also their aptitude to vegetate, and draw from the bottom of the earth, those fruits which are to be the support of animals. There is no conformation better adapted to contain, in the smallest space possible, such a collection of fibres, filaments, tubes, and vessels necessary to vegetative life, than the cylindric form of their trunks and branches. There is none likewise which so happily resists any dangerous shock and every kind of friction, and consequently equally calculated to preserve them intire for so long a space of time. And as to the branches which form regular divisions, and in their different flexures seem to fear alike wandering too far from the trunk, and incommoding each other, they could not

not possibly take a more suitable direction to fill up and improve every point of space which nature has assigned them. The leaves and flowers also have their particular uses: those are destined to favour transpiration, and these serve to envelope the tender fruit after it has just forsaken its matrix. In a word, it is impossible to conceive of conformations that could more effectually answer the designs of their creation.

In the animal world, the variety, regularity, and just proportions of their different members, confer peculiar graces upon the body to which they are united. But this is not the only, it is not the principal advantage derived from hence. To these it is that animals owe their strength, their address, and their agility. Qualities much more necessary to their preservation than beauty. Yet what shall we say of the contours which nature has given them! Could the form any thing

more

more beautiful and charming? By their delicacy they discover a most agreeable mixture of lights and shades: by their softness and fluidity they give rise to a thousand different forms, equally full of grace and expression. Each muscle that acts, each inward emotion of mind, occasions some external change. The contour swells or dies away, contracts or elongates itself, according as the animal is agitated by fear or anger, joy or sorrow. The painter, in his most enthusiastic moments, sometimes catches these visible forms which nature has given to the sentiments of the mind: and this is the summit of his skill in imitating that infinite wisdom, which hath presided over the formation of animated nature.

There cannot be, we alledge, contours susceptible of more grace than those which nature has appropriated to the bodies of animals. But we add, that there are none which admit of so great a variety of

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movements. Animals, according to their formation, are capable of extending and unfolding themselves; or of folding themselves up, and turning a thousand different ways: and yet whatever is their attitude, they always preserve their equilibrium. Some animals will slide over the most rugged surface, or pass through the narrowest defiles with the swiftness of a meteor. And though they are not all equally supple and active, it is obvious that these qualities are to a certain degree necessary for each: it is by these that they accommodate themselves to the places they frequent; that they seek and seize their food with so much facility, and avoid with so much address every threatening blow. Give them a form different from those they have actually received, and you immediately destroy qualities essential to their well-being.

Meer strength requires solidity only ; but when it is united with suppleness and activity, what a multitude of combinations does it not demand ? It requires an infinite number of springs, and that each spring be nicely poised ; that it have that precise weight, fold, and firmness, as is necessary to produce its effects, and nothing more. It requires these springs to be extremely minute, so as to occupy all together, the smallest space possible, at the same time that they preserve the full liberty of action : it requires that they all be comprehended in that kind of contours, which best elude resistance ; that is in contours that are simple, uniform, and flowing. In a word, to unite in the same body strength, suppleness, and agility, the most regular arrangement, symmetry, justness, and proportion are requisite, and of consequence beauty ; which necessarily results from the re-union of all those qualities.

* See Hogarth's Analysis of Beauty.

The beauty of forms, therefore, observable in the animal system, is subordinate to their utility. And they accordingly please us in proportion to their aptitude to unite these two objects. We contemplate the elegant make of a swan with pleasure; but this pleasure is redoubled when we behold the ease and dignity of its motion; or when we see it extend its graceful neck, and fish up its food from the bottom of the waters. On the other hand, the value of a figure diminishes in our estimation in proportion to its insufficiency. The legs of a stag, in their present connection, are not destitute of beauty; but place them under the enormous bulk of an elephant, and they will appear much inferior to those clumsy columns which support this monstrous animal. Poets have attempted to surpass nature, by uniting in one figure, the beauties she has divided amongst several. They have given wings to men and quadrupeds: they have imagined

lions with the beaks of eagles, and fish with human heads. But they only resemble those who cut off the tail and ears of their domestic animals, to ornament them with bells and ribbands. They destroy nature, and substitute absurdities in their place. However beautiful their Pegasus, and Centaur, and Satyr, and Dolphin may appear in painting, they would be but hideous figures were they realized. A young man with his back adorned with plumes, and embarrassed with a large pair of useless wings, would as certainly pass for a monster as an angel. How superior to these lame and puerile figures, are the simple and majestic designs of nature! She has furnished birds with wings; but how gracefully does their light and elegant form correspond with this attire? She has given them a long frail neck, terminating in a point; but we immediately perceive that the other parts of the body required such an instrument, and that it serves at once for a prow and a balance.

Even

Even inanimate bodies themselves derive, in great measure, their beauty from their aptitude to the uses for which they are destined. Hence it is, that wreathed and fluted columns, which appear so graceful supporting a proportionate weight, have the contrary effect under piles of building that exceed their strength. And hence it is, that the modern carriages, are with less ornament, more beautiful than those formerly in fashion.

But you will say, allowing that the justness and elegance of figure in animals contributes to adapt them to the uses of their creation, we cannot see in what respects those admirable colours nature has thrown with so much profusion upon the surface of some of these forms, promote this end; and consequently they possess beauties independent of aptitude. We answer, these beauties may, and actually do, in some other respects, contribute to their well-being, and this is suf-

ficient. All that we plead for at present is, that God never errs from this design in any of the qualities he has communicated to his creatures. To imagine that he adorns merely for the sake of ornament, is to place him upon a level with men, who often work merely to exhibit their skill, and whose productions have accordingly no particular and determined use. The beauties conferred upon different animals is useful in various respects, besides that already specified. It is this which attaches them so closely to their own being; it is this which renders them so attentive to cleanse, ornament, and take care of themselves: for with their beauty they have received the consciousness of it, and a desire to preserve it. What complacency appears in the glances they cast upon themselves! What expressions of self-admiration in their tone, and in their gait! They are continually occupied to preserve, in all its lustre, the enamel which nature has given them:

and

and these offices contribute not a little to their health. They not only perceive the value of their own beauty, but they behold and admire it in others. This is undoubtedly the case with regard to both sexes of the same species: never are they so attentive to display the graces nature has bestowed; never are they so ostentatious, as when they are together: and, if we may judge of them from our own feelings, how greatly must this disposition contribute to their felicity?



PART THE SECOND.

SECTION I.

*Of the perpetual Opposition that subsists be-
twixt Animals of a different Race.*

THERE is another phenomenon in the animal system, which merits all our attention; and which we shall consider in the same point of view as the preceding.—One part of life is perpetually at war with the other; one half of this living substance feeds upon another. A phenomenon this which has greatly embarrassed multitudes. How many things have been alledged to reconcile it with the ideas of a beneficent Providence, that
5 watches

watches over the happiness and preservation of all his creatures.

Some have supposed that it was a necessary consequence of that universal corruption, in which they imagine all nature to have been involved, since the fall of Adam; and to furnish some exceptions, at least, to such bad examples, they have rigorously obtained from the use of Flesh.——Others have thought that there must be a future state, a paradise provided for the wretched martyrs amongst the brutal race, as well as for those who merit this title amongst the human.——Not to observe that these hypotheses are void of foundation in the actual constitution of things; they do not remove the difficulties, but only substitute one in the place of another. The truth is, when we would form just ideas of the plan of Providence, we are not to reason after our own imagination, or regulate our judgments according to the decisions of

of a pretended infallibility, which some arrogate to themselves. We should adhere to facts; collect as many of these as possible; contemplate them on all sides; compare them together, and make their mutual relation or disagreement the foundation of our reasonings.

It is very evident that Providence not only permits, but has designed, that animals should devour each other. If any one doubt of this, let him consult the common impulses of his nature. From whence proceed those involuntary horrors at the approach of some animals, and that mechanical desire, as it were, of falling upon them?—Persons of delicacy, and polished manners, will assert, perhaps, that they are strangers to these emotions, and that they do not find in others examples enough to constitute a general rule. But if such propensities are unknown to them, it is because they have been subdued by those gentle manners, that mildness

ness of disposition, which they have acquired in civil life : yet they still lie concealed in their nature, and there are seasons when they will break forth in spite of all these barriers. "Civil society" (says an excellent modern critic) "first of all tames us to humanity ; and, in the course of its discipline, brings us all to a dead level : its effect is to make us all the same pliant and obsequious thing. But when the violent passions arise (as in the case of those apes, when the apples were thrown before them) this artificial discipline is thrown off ; and we return to the free and ferocious state of nature (b)."

But we will not insist too much upon these propensities : there are others still more deeply impressed. — From whence arises that desire apparent in most men to feed upon flesh ? Or if you suspect hu-

(b) Hurd's Notes on the Art of Poetry.

man nature to be depraved in this respect; examine the other species! See how some animals thirst after the blood of others; how nature has armed them with claws and teeth to put their bloody purpose in execution; while she has only endowed the victims of their fury with vigilance and activity; and to others she has left no other means of defence than cries and groans. Consider the voraciousness of the eagle, the surprising strength of its bill; and its piercing eye, that darts swift as lightning upon the most distant objects: contemplate the spider's web, with what truth is it constructed; and with what address do they employ it to entangle their prey. It is evident, I say, that animals are in a state of perpetual war, and that it is the will of their Creator that one should live upon another. — And what is the consequence? That the works of the Omnipotent are defective? Or that the world, which was created perfect, has since fallen into a general depravity? These by

no

no

no means follow. Proofs of the depravity of nature may be sought after elsewhere. It is no less certain, that the law which enjoins the destruction of one animal for the advantage of another, contributes to the increase and happiness of life. This we shall now attempt to prove.

THE first proposition is of the nature of that which is a little more

SECTION II.

than to be mentioned, in order to con-
*The Devastation which takes place in an animal
 Life, contributes to its Re-production and
 its Well-being.*

IT will doubtless be acknowledged, that the law which appoints one Animal to become the food of another, contributes to the augmentation and happiness of life, if we can prove the two following propositions. 1. That it introduces several new species, which could not otherwise exist. 2. That the account of these new species is not, in any respect, prejudicial to the other; but on the other hand, useful,

ful, and in some respects, necessary to them.

S E C T. III.

The first Proposition proved.

THE first proposition is of the nature of those that require little more than to be mentioned, in order to convince us of their truth. How great a variety of new species of animals does this law introduce into the system of nature! It introduces

(1.) Those reptiles and insects which swarm about dead bodies, and feed upon their substance.——To judge from appearances, we should imagine that these animals were produced by putrefaction itself. And this indeed was the opinion of the ancients. But modern naturalists have found, by a more accurate examination, that they owe their existence to the eggs

deposited by some other insect. They have put fresh meat into different vessels, some of which they have left open, and others covered with a fine cloth. The flesh thus inclosed has putrefied, and been converted into a thick and offensive fluid, without producing any animals, although it had communication with the external air. Those, on the contrary, which were quite exposed to the atmosphere, have been filled with worms in a very short space, and these worms have been transformed into moths, exactly similar to those which were at first observed to surround these substances (c).

But further, this opinion of the ancients was principally founded upon certain transformations which they imagined took place in some animals; but it has been demonstrated that these transformations are absolutely chimerical; that the

(c) *Prædictæ Rhodæ et Generationes Insectorum*

animal, which appears first as a caterpillar, afterwards a nymph, and lastly a butterfly, inclosed even in the form of caterpillar, the feet, wings, antherae, and, in a word, all the members peculiar to a butterfly; and that the different changes it undergoes, consist merely in the development of these members, which were most curiously folded up, and tightly swathed round as it were with different coverings, just as the bud of a flower always incloses the same fruit, though under different appearances (d).

But it is sufficient for our purpose that this race lives upon animal food; as we are intitled to give it a place amongst those which are introduced into the animal system, by the law we are attempting to vindicate.

(2.) To these species we must add those that attach themselves to the bodies

(d) Swammerdama's History of Insects.

of living animals, and draw their nourishment from thence. The numbers that are of this species, are scarcely to be conceived. There is no quadruped, no bird, no animal whatever, obvious to the naked eye, where other animals may not be found feeding upon their substance, endowed with different forms, and furnished with different arms according to the nature of the bodies upon which they feed (g). There is, in fresh water, an insect, which appears but a point as it were; yet when it is examined by the microscope, you may discover that it is continually employed in defending itself against other insects of a much smaller size; and what is the more extraordinary, nature has, for this purpose, armed it with a kind of scourge, with which it is incessantly beating its sides.—It is true, these animals, as well as those we have mentioned above, appear to us mean and contemptible;

(g) Francisc. Rhedi de Ged. Insect. pag. 350.

but whatever they may be in our estimation, they are still the production of omnipotence; and they possess, in common with other animals, which may seem more important, fibres, tendons, muscles, veins, arteries, circulating fluids, that wonderful arrangement of springs, that action and re-action of an infinite number of causes, or, in a word, that inexplicable something which constitutes the essence of animal life, and which no man can comprehend.—The sentiments of abhorrence that we find within ourselves, with regard to some animals, are intirely relative to their situation respecting us; but it is not in this point of view that we are to contemplate them, when we would form a just estimate of the excellence of their being (b).

3. We
 (b) If we judge of this insect according to the accounts given us by some naturalists, who have examined them with care, and free from prejudice, we shall have very different ideas of them.

“ Though

3. We observe a multitude of birds, continually employed in digging up, and destroying the reptiles and insects which live upon the surface of the earth, and upon

"Though every thing," says Mr. Baker, speaking of aquatic insects, "is alike easy to an infinite and almighty BEING; yet, according to human comprehension, it appears extremely wonderful, that we find, almost without exception, in these specks of life, whose minuteness renders them almost imperceptible to the eye of man, a greater number of members to be put in motion, more wheels and pulleys to be kept going, a greater variety of machinery, an apparatus more complex and curious, a plan seemingly of deeper contrivance; in short, more elegance and *workmanship* (if the term may be excused) in the composition, more beauty and ornament in the finishing, than are seen in the enormous bulk of the elephant, the crocodile, and the whale, compared with which one would think them no less the effect of a more exquisite and superior art, than the movements of a watch appear to be on comparison with the wheels of a coach or waggon." Baker's Employment for the Microscope, Introduction to Part 2.

trees and plants. This is another order in those new species of animals, that are introduced into the world by that plan of Providence of which we are treating. And it must be acknowledged that these birds are wonderfully adapted to the places they occupy, both with respect to their form, size, and the acuteness of their senses. Their bill is thin and long, their claws obtuse, their wings short, their flight precipitate; their size is smaller than that of the winged species in general, by which means they readily pass into places, where they expect to find their prey, and carry it off in spite of every retrenchment.—It is observable, that they are continually employed in scratching up the earth; by this artifice they draw the worms towards the surface, and readily catch them.

4. Amongst these are the winged race also, which hover over the waters, and feed upon fish: and perhaps there is no race

race more numerous. From one extremity of the globe to the other, the marshes, lakes, rivers, creeks, bays, gulfs, and sea-coasts are peopled by these animals, and resound with their cries. They abound upon every coast of the habitable parts of the earth; and the doubtful pilot, whenever he sees them, is no longer uncertain what course to steer, as they all of them differ, in some respects, according to the parts they frequent. It is impossible to read the accounts of travellers without admiring the wisdom of Providence, which has provided inhabitants for the most detached, and most desolate quarters of the globe.

5. Of this number are the carnivorous race likewise, that are confined to the land, such as lions, tygers, wolves, bears, amongst the quadrupeds; eagles, vultures, cormorants, hawks, amongst the birds.

—It must be acknowledged that, next to man, this species of animals is the most perfect of any. Their lofty and active

gait, their bold and piercing looks, their courage, their strength, their ferocity, their rage, all demonstrate that they have received a double portion of the living principle. And yet were it not for this institution of Providence, that one part of the animal substance should live upon the other, they must necessarily have been excluded from the creation.

6. We proceed further, and assert, that man himself is to be ranked amongst the species which exist in the animal system in consequence of this institution. Does he not live chiefly upon flesh? And suppose there are some that are supported by vegetables only, yet is their number equal to the others? And is the vigor, strength, and courage of this class to be placed in competition with the vigor, strength, and courage of those that live upon animal food? Without such an institution of Providence, three-fourths of the human species would be destitute of
sustenance.

sustenance; for all the human race could not possibly live upon the fruits of the earth. The greatest part of her productions are not fit for use before they have been digested, and converted into the substance of the animals which feed upon them. And with respect to those who live immediately upon vegetable food, there are few countries that produce it in quantities sufficient to render it the only support of their inhabitants. But let us suppose the earth to enjoy all the fertility requisite for this purpose, it could not enjoy it, especially in some parts, but in consequence of cultivation (*g*). But this cultivation requires leisure, skill, improvements (*h*); it requires some acquaintance with the operations

(*g*) In America, the earth spontaneously produces a great abundance of fruits. I suspect that Europe would not enjoy this advantage, was the earth to remain uncultivated: we should see little more than forests, oaks, and other barren trees. *Esprit des Loix*, liv. 16. ch. 9.

(*h*) *Esprit des Loix*, liv. 18. ch. 15.

rations necessary for the production of plants: it requires the plow, the spade, the mattock; that is, a knowledge of metals, and how to work them (i): it supposes also some established community, certain forms

(i) Mr. Locke considers the discovery of iron as the foundation of the arts and sciences. Of what consequence, says he, the discovery of one natural body, and its properties may be to human life, the whole great continent of America is a convincing instance; whose ignorance in useful arts, and want of the greatest parts of the conveniences of life in a country that abounded with all sorts of natural plenty, I think, may be attributed to their ignorance of what was to be found in a very ordinary, despicable stone; I mean, the mineral iron. And whatever we think of our parts, or improvements in this part of the world, where knowledge and plenty seem to vie with each other; yet to any one that will seriously reflect on it, I suppose it will appear past doubt, that were the use of iron lost amongst us, we should, in a few ages, be unavoidably reduced to the want and ignorance of the ancient savage Americans, whose natural endowments and provisions

forms of government, and a favourable situation with respect to the neighbouring nations. It requires that those who cultivate the earth, should be persuaded of protection against the injustice of individuals, and the rapine of a foreign enemy. Where any one of these circumstances is wanting, it will be extremely difficult, not to say impracticable, to establish agriculture, particularly in the colder climates, where the earth is fruitful for some few months in the year only, and

sions come no way short of those of the most flourishing and polite nations. Lib. 4. c. 13.
§. 11. Locke's Essay concern. Underst.

When the savages of Canada stand in need of a hatchet, they take a flint; and after having employed much time and pains to sharpen it, and reduce it to a convenient form, they insert it in a young tree, in which they have previously made an aperture. Afterwards, when it is grown, and the flint incorporated with it, so as to become immoveably fixed, they cut down the tree; and this instrument serves instead of a hatchet. Charlevoix, tom. 6. p. 50.

where

where men are obliged, in consequence, to lay up store of provisions for the winter season. And can it be said that these circumstances equally unite in favour of all mankind? What numbers that are ignorant of the very name of this art? What numbers, who being continually surrounded by savage and vagrant nations, have no other security than the desolation of the country they inhabit (k). What numbers, whom indolence, savage manners, inseparable from their condition, and above all their extream indigence, prevent from applying themselves to this art. A people, that are obliged to pass continually from mountain to mountain, from forest to forest, in search of the necessities of life, and find nothing more than meer necessities, little think of dwelling upon a particular spot, of cultivating it, and

(k) Those countries which are the most fertile are the most frequently depopulated, whilst the desolate countries of the north are always inhabited, because they are almost uninhabitable. *Esprit des Loix*, liv. 10. chap. 3d.

wait-

waiting patiently till the time of harvest. Such was formerly the state of Europe. The human race had peopled all the different parts of it long before agriculture was known (1). Such is the present state of large numbers of people in America. And they will doubtless continue in the same situation, till several of them, being united by foreign conquests into one empire, shall establish some form of government that will be more regular at home, and more respectable abroad. It was merely by virtue of the conquests which were first made by the Egyptians and Phenicians, then the Greeks and Romans, and afterwards the Franks, under the empire of Charlemagne, that the arts and sciences found their way to the very centre of Europe. In a word, the invention of agriculture is the effect of chance, and its establishment must proceed from the union of a great variety of circumstances

(1) See Pellontier Histoire des Celtes, tom. vi.

that

that are not in the power of every nation. What proof therefore can be more conclusive, that men are destined to feed upon the flesh of animals, and not merely upon the produce of the earth? And accordingly is this intention of Providence deeply imprinted upon the manners, appetites, and customs of the greatest part of the human species. Most nations are fond of hunting, and pursue it; most regard the flesh of animals as their favourite food.

It has been remarked that the teeth in men are formed differently from those of the carnivorous race; and therefore they cannot, according to the intention of nature, belong to this class of animals. But it is certain that they have four-eye teeth, as they are termed, which is not the case with the animals that live entirely upon fruits. Suppose, however, the human species to be destitute of this kind of instrument, which is appropriated to seize, and

and tear the food in pieces, rather than to chew it, men do not, it is very apparent, stand in absolute need of such an invention, since nature has furnished them with more powerful methods of producing this effect. It has been further alledged, that men cannot make use of flesh till it has been prepared by fire; and they have added (very judiciously without doubt) that even in this state, the sick are always denied the use of it. Not to observe that these assertions are not absolutely true, since there have been, and still remain, whole nations that subsist upon raw flesh: they are of equal force against the use of vegetables, which scarcely agree better with our stomachs, except they have been stewed or boiled. Again, the same conclusion has been drawn from the structure of the human intestines (m): it is true that they are both longer, and more relaxed than those of carnivorous

(m) Monro's Comparative Anatomy.

Quadrupeds. But this difference seems to arise from hence; in men the teeth are principally grinders, while those of other animals are chiefly incisive: in the former, the food enters the stomach properly manducated, and prepared for digestion; whereas the latter swallow it in such large pieces that it is totally unfit to pass into the intestines; and we accordingly find, that in dogs, which are the most greedy animals, and frequently swallow bones themselves, the villous coat of the stomach has its folds running in a longitudinal direction, instead of the transverse. We find also this coat remarkably strong in serpents, that swallow animals entire. This viscous being closely imprisoned by the surrounding ribs and vertebrae, seems to be assisted in its functions by their immediate pressure. In a word, pullets, and all the winged species that feed upon grain, and swallow it whole, have the stomach composed of an infinite number of muscular fibres interwoven; and the

the internal surface is lined with a kind of callous substance, to which are affixed small pebbles, or little pieces of glass. While the intestines of those quadrupeds, which likewise feed upon grain, but grind it with their teeth, are not of similar construction; though some of them are not larger than this species of fowl. These observations seem to indicate that the structure of the intestines depends, in some measure, upon that of the jaw; and that, consequently, those membranes, which line the intestines of carnivorous animals, are formed with such thickness and strength as they are to receive the food but grossly separated, and imperfectly manducated: whether this formation be required more effectually to resist the influx of bile, so necessary to dissolve this grosser food, or to compleat the digestion which the teeth had but rudely began. We say, therefore, in two words, that the teeth in men are not formed similar to those of other carnivorous animals, because

cause such a form was not necessary; and that their intestines are not of equal strength with those of the latter, because the construction of their teeth render such a force superfluous. Nature does nothing in vain.

S E C T. IV.

The second Proposition proved.

WE have been enumerating the different species introduced into the animal system, by that law of nature which enjoins the destruction of one animal for the good of another. We are now to prove that the accession of this new species, so far from being injurious, is both advantageous, and essentially necessary to them. This second proposition must be considered, according as it relates to the two different classes of animals which live upon flesh; for some are carnivorous without destroying their prey; others both destroy and devour.

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Our proposition is already proved with respect to the first class of carnivorous animals. — It is evident that an increase of life results from their existence, which is no ways injurious to the other species. A cursory examination of their origin, progress, and employment, will immediately demonstrate, that they are created to gather the spoils of life in some, and to preserve others in health and vigor. An animal no sooner expires, than we behold them assembled in swarms around the carcase. Some seem to have sprung from the substance itself; others are allured by the vapours exhaling from it; and which are scattered by the wind: the body quickly becomes a re-animated mass; the different parts of which are afterwards dispersed, and resign in their turn the gift of life to other species, or preserve it according to their particular order and class (n).

Such

(n) I inclosed, says Rhedi, some fish, called Barbes, in a box, perforated with several holes, and

Such is the wonderful oeconomy of nature! Thus it is that by multiplying the
Species

and upon opening the box about four hours afterwards, I found an innumerable multitude of very small worms upon the fish, and lodged in the interior crevices of the wood; and about the worms there were heaps of little eggs, some of a white, others of a yellow colour; these, when broke, emitted a whitish liquor, thinner than the white of a bird's egg, but not so viscid. I replaced the box in its former situation; and upon opening it a second time, I saw that all these eggs had produced worms, and that the empty shells remained in the place where they had been deposited. I found also that the worms, which made their appearance the day before, were as big again as they were the moment they burst their shell; and what is still more surprising, they were grown the day after to such a size that each of them weighed about seven grains, though twenty or thirty of them before did not exceed a grain. Others, which sprung from these eggs, though they were extremely minute, consumed the fish in a moment, leaving the bones only, which appeared like so many skeletons just brought out of the cabinet of the most curious ana-

species, the living substance suffers no diminution ! Its very destruction serves to re-produce it ! Thus does the flame of life, after it is extinguished in one class of animals, immediately re-kindle itself in another, and burn with fresh lustre and strength !

But this is not the only advantage that results from their existence. By consum-

anatomist in Europe, so nicely were they dissected. I then carefully shut up the box, so that the worms, notwithstanding all their efforts, could not possibly escape; and I found, that in the space of five or six days after they were first hatched, they were transformed into as many eggs; and that some time after, there sprung from these eggs flies of a green, and gnats of an azure or black colour. Twenty days afterwards, having observed that some eggs of a blackish hue had as yet produced nothing, I put them in a vessel by themselves; and, in the space of two days, there was a large quantity of gnats which greatly surpassed the eggs in number. This induced me to open some of them; and I found that each contained no less than 25 or 30, and some to the number of 46. Rhedi. de Gen. Inst.

ing these carcases, and that in so short a time, they prevent them from infecting the air with their exhalations; and thus contribute to the life and health of all the other animals. There is not, perhaps, a spot upon the globe where this effect is more apparent than in the neighbourhood of Carthage in South America. The climate here is extremely warm; the air is rendered humid by violent rains; the country is fertile, and covered with immense forests: all these circumstances conspire to favour putrefaction, which would, in a short time, render the air extremely unwholsome, was it not for a prodigious quantity of gallinazos, which nature seems to have expressly commissioned to consume the carrion, and every kind of ordure. This bird is furnished with a large bag, or craw, under its bill, composed of a thick, fleshy, supple membrane, which distends like leather. It is inconceivable the quantity of filth this will contain. So exquisite is the organ
of

of smell, that this bird will scent its prey at the distance of three or four leagues; and such is its voracity, that it will never leave till it has intirely consumed it (e). In Egypt, when the waters retire from the Nile, and the lands are covered with frogs, and numberless insects, myriads of pelicans, cranes, and other birds of prey, arrive from the red sea, and the coasts of Greece; which soon relieve the country of this super-abundance of life; and thus render themselves of the utmost utility to the inhabitants (f). But without going so far for examples, this species of animals are seen in every country; and particularly near large cities. To them it is that we are in part indebted for the purity of the air we breathe: considerations which ought doubtless to secure them from every insult; and yet, in some countries, the inhabitants not only destroy

(e) Don Ulloa's Voyage to Peru, liv. 1. chap. 7.

(f) Hasselquist's Voyage up the Levant.

them, but think that they are removing a nuisance.

The Hottentots, Caffres, Negroes, and the people in general which inhabit the coasts of Africa, are very fond of dead bodies, and devour even their excrements (g). The Tartars eat horses, dromedaries, and all their domestic animals in general, which die of themselves; and what is more remarkable, they keep a set of dogs, on purpose to be devoured by them in return, after their decease, regarding this as the most honourable burial. Their grand Seigniors keep these animals in their houses, and they constitute a part of their retinue. The common people, who cannot otherways support them, keep a pack in common, to perform this kind office for them one day or other. When they let these animals loose

(g) Dapper Description de l'Afrique. Recit Historial du Royaume de Guinée à Amsterd. 1595.

upon

upon the deceased, the attendants judge favourably or disavourably of the soul, according to the number that surround the body. Half a dozen at least are necessary to form a happy omen of his state (r). As remote as these customs may appear from the order of nature, perhaps they deviate less than those of which we have been speaking.

Thus have we considered our second general proposition with respect to the species which are carnivorous without killing their prey.

(r) In Hyrcania plebs publicos illos canes, estimatos domesticos; nobile autem illud canum genus scimus esse, sed pro sua quisque facultate parat a quibus lanietur, eamque optimam illi consetur esse sepulturam. Cic. Tuscul. Quæst. liv. 1. chap. 45. See also Hanway's Travels, c. 8.

S E C T. V.

*Of the Law which enjoins the Multiplication
of Animals; and of its Effects.*

TO all the inhabitants of the earth this command of Providence, "increase and multiply," was issued forth; and as it is upon the observance of this law that the preservation of the different species depend, all are rendered capable of observing it; and they are universally incited to this by the most powerful of motives. The allurements of pleasure, the desire of peace and tranquillity, the desire of abundance, the desire of satisfying the demands of hunger and repose, the desire of life itself, all yield to this (s). So that it is natural for every species to procreate, though procreation is more or less abundant, according to the rank they occupy in the animal

(s) Virg. Georg. lib. 3. v. 257.

system. It has been remarked that horned cattle, buffaloes, and in general all the animals which graze, thrive better in America than the carnivorous race (1). This appears to be universally the case; and I believe that those who talk of certain countries where droves of wolves are as common as flocks of sheep with us, amuse us with fables (2). For it is evident, that the carnivorous race must necessarily exist in a much less abundance than the animals upon which they feed.

It has been asserted farther, that the species were less carnivorous in America, and, at the same time, more fruitful, than in other parts of the globe (3). Without examining into the reasons upon which this assertion is founded, we shall content ourselves with observing, that it is con-

(1) *Esprit de Loix*, lib. 18, c. 9.

(2) It has been said of Kamtschatka. See the *History of Kamtschatka* translated into English.

(3) *Brooke's Natural History*.

trary to the law of nature, according to which the voraciousness of one part of the animal system, always bears an exact proportion to the fecundity of the other; that it is also contrary to what is reported of certain species of animals, which inhabit that part of the world, such as tigers and galinazos in the neighbourhood of Carthage, crocodiles in the river of Guyaquil, eagles in the desert of Andes, and wild cats in Louisiana. But be this as it may, we find amongst us animals which are prolific to an incredible degree; so that neither the depredations of men, or beasts of prey, are able to extinguish their race. They subsist in opposition to these united efforts; and upon the smallest intermission of slaughter, they presently recruit their numbers. Of this kind, for example, are goats and deer, rabbits, hares, &c. It is difficult to conceive to what a degree nature has endowed these animals with the power of propagation. The females amongst hares and rabbits

rabbits scarce quit the dug but they admit the male, and contribute to the augmentation of their species; at the expiration of 31 days they bring forth their young, and produce four or five at a litter. Those who have dissected these animals inform us, that they have a double matrix, each horn or bag constituting one; and by this construction of the parts of generation, they are capable of receiving the male, notwithstanding several previous conceptions; so that they have frequently a super-fetation, or double brood (y). Thus it is that these animals readily repair their loss, and that the few which remain in one season, are sufficient to replenish their number by the season ensuing.

And yet their fecundity, remarkable as it may appear, does not point out the limits which nature has prescribed in this respect. Some species carry this faculty still further. Rats, mice, field-mice

(y) Buffon's Natural History.

are much more prolific, and sudden in their appearance. It is but a few years since a neighbouring nation was in danger of being bored through, and utterly destroyed in the space of three months by one of these species. And what shall we say of certain insects, which require but a few days to multiply their race, in such a manner as to overspread and destroy extensive plains, nay, whole countries themselves. What shall we say of certain fish, the cod-fish for example, of which *one alone* is sufficient to stock, in a few years, not only the whole extent of ocean, but the universe itself (z). In every species,

(x) The number of spawn laid by some fish is almost incredible; the roe of the cod-fish, for example, in the space of a cube of one-fourth of an inch, contains 250 eggs; and according to that proportion, the whole must contain about 1,000,000. The great Mr. Lewenhoeck tells us, that in the space of a small sand of the male-seed of the cod-fish there are above ten thousand animalcules. Now supposing that every egg or spawn of a single cod-fish should come to perfection, and that

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but particularly those we have just mentioned, life may be considered as an impetuous torrent, which is incessantly bearing down, and beating against the banks that oppose its course; and whenever it breaks through this barrier, it spreads into a tremendous ocean. Hanway relates, that when the grasshoppers pass from Persia into the kingdom of Astracan, the air is darkened by their numbers, and the

in five years time every one of those fish should be capable of producing others, supposing only half of them females, the increase of them would then be 5,000,000,000; and five years afterward, by the same reckoning, there would be an increase of about a thousand miriads of miriads: which increase, in the space of ten years, from one single fish, would give us room to suppose that in a thousand years, at that rate, the cod only, so propagated, would fill up more space than the whole world contains. Nor are the fish of the rivers and lakes less prolific, considering their proportion. A carp does not spawn less than 20,000, and perhaps a tench half as many. *Bradley's Philosoph. Account of the Works of Nature.*

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verdure of the fields, wherever they repose, is in less than an hour totally destroyed. This author adds, that, overcome with fatigue, they sometimes fall into the rivers, or the sea, where they assemble themselves into distinct companies, and swim upon the surface of the water, in such multitudes, that it is with difficulty vessels are able to force a passage through them (a). Shaw relates also that they sally forth in large bodies, so as to stop up, by their numbers, the dikes filled with water, and to extinguish the hedges set on fire to oppose their course: that they pass like a succession of clouds, and that the last company will devour the very bark from the trees (b).

If there are some species whose progress is less rapid, it is because their larger, and more complicated make, requires greater length of time to bring them to perfection. The desire of propagation is other-

(a) Hanway's Trav. chap. 19. p. 85.

(b) Shaw's Travels into Barbary.

ways common to them all (c). Nature has crowned these desires in all with such a liberal hand, that there is no species left to itself, and secure from every injury, but what would propagate, till at length it over-run the other species, with which it ought to observe a constant æquilibrium. Should any person demand examples of the prodigious effects of multiplication, even in those species which appear the least prolific, let them consider the progress which some of our domestic animals have made in America. About half a dozen horses, and as many cows, exported by the Spaniards to Buenos-Aires, have long since peopled and over-run an immense extent of country that lies betwixt *La Plata*, and the straits of Magellan. They are so numerous that they are destroyed by thousands merely for their skin and

(c) Omne adeo genus in terris hominumque
ferarumque,

Et genus æquoreum, pecudes, pictæque volucres
In furias, ignemque ruunt. Amor omnibus idem.

Virg. Georg. lib. 3, v. 242.

fat.

-fat (*d*). The same number of grey-hounds, sent by a vice-roy of Peru into Fernandis island, has made a similar progress (*e*). A multitude of horses, and wild dogs, are also found in the island of St. Domingo, which owe their origin to some few individuals of this species which the Spaniards brought with them (*f*).

Let us now inquire into the consequences which necessarily result from this multiplication of every species, and they will give us just and clear ideas of our second proposition, viz. that the introduction of the carnivorous race into the animal system, so far from being injurious to the other species, is, on the contrary extremely useful and salutary.

(*d*) Anson's Voyage.

(*e*) Don Ulloa's Voyage, tom. 2.

(*f*) Labbat. tom. 7. pag. 197.

SECT.

S E C T. VI.

*Of the Consequences which necessarily result
from the Law of Multiplication.*

WHAT is the consequence of this astonishing increase, common to every species, when they are protected from injuries, and able to supply their own wants? It is that all, without exception, require some coercive force to suppress their progress, and to prevent their exceeding a due proportion relative to the other species. For it is apparent, that without this, the law of multiplication, so necessary for their preservation, would threaten their immediate destruction. For whenever one species is predominant, it must necessarily deprive the others of their nutriment. It would also infect the air with noxious exhalations; especially when such innumerable multitudes come to be mowed down by death: and from all these

G 2 *causes*

causes united, a universal languor and debility of the animal system, must unavoidably take place. The reader needs not to be reminded of the plagues with which God visited Egypt, particularly the frogs and insects; or of the mortality which followed. Or was he to recollect what we have just related concerning the grasshoppers in Barbary, he would easily conceive the miseries of a country, where the trees themselves are devoured to the quick, where the earth, spoiled of its treasures, presents to the view nothing but the footsteps of mournful desolation. Of all the scourges with which God afflicts his creatures, none perhaps are more terrible than this.—There is in Augenmois in France, a small insect that attaches itself to the corn, both in granaries, and in the fields; and which has increased to such a degree, as to consume the greatest part of it, so that the common people were destitute of bread (g). May-bugs, some

(g) Journal des Savants, Decr. 1742.

years

years ago, laid waste several districts in England. And a sea-worm increased beyond its due proportion, has, more than once, brought Holland to the very brink of destruction.

As there is no country exempt from these inundations of life, so is there no species incapable of it; and which ever they be, they become a scourge, not only to the other species, by these means confined within too narrow limits, and robbed of its food, but also to themselves. For it is with the animal as with the vegetable system: the different species can only subsist in proportion to the extent of land they occupy; and whenever the number of individuals exceeds this proportion, they must decline and perish. A superabundance of life must always occasion a scarcity of provision. Such numbers of bodies also continually moving about in the same column of air, must soon absorb all

its vital salts ; and the air thus exhausted and heated, will, at length, become of a pernicious quality. The human race itself experiences the truth of this assertion. In all large cities, where the poor, that is the majority of the inhabitants, are crowded together in close, and filthy quarters, this additional loss every year is very considerable.

S E C T. VII.

Of the different Effects produced by the Increase of the human Species, according to the particular circumstances of their Situation.

WHAT we have been advancing leads us naturally to make some observations concerning the increase of the human race. Some people imagine that it cannot be too extensive : they speak of population as an event which always contributes to the welfare of a state, and

as such meriting the encouragement of the sovereign. But the truth is, that the consequences widely differ according to the state of the country where it takes place. Amongst a free and enlightened people, who are secured by the situation of their country, or any other means, from all foreign invasion; where every tract of land may be improved, the human race cannot be too numerous. In such a nation every man enjoys an establishment, is protected by the laws from the assaults of individuals, and by the strength of the state against the attack of foreign enemies. Here agriculture, the manufactures, and the arts and sciences in general, most commonly flourish. Here, every spot of ground turns to some account; and those commodities which the country will not produce, are brought by commerce from distant climates. Who could have imagined that the concourse of people who retired to Holland, in the time of the duke of Alva, could have found subsistence

there? But it was sufficient for this people to have known the arts and sciences, and to have found a retreat where they could apply themselves, without molestation, to procure those supplies by industry, which this marshy soil refused to yield them.

But although there are some countries where the increase of the human species is always advantageous, there are others where it is pernicious. There are countries, where, as *Monf. de Montesquieu* expresses it, a man is worth nothing (*b*); there are others where he is worth less than nothing. Of the first class are those civilized nations, where, by some change of circumstances, the resources are less numerous than the inhabitants; where numbers are, of consequence, out of employ, and useless to the state. Such again are the countries where the air, the provisions, manners of living, &c. are favour-

(*b*) *Esprit des Loix*, liv. 22. c. 92.

able, but want of fertility is injurious to population. As is the case in China. — Of the second class are the countries inhabited by Savages and Barbarians that live by hunting, or upon the milk of their cattle; and consequently demand a large extent of land for their support. To introduce new inhabitants into these countries, is to introduce violence, rapine, and murder; for they could only subsist by plundering the natives. The inhabitants of Canada sufficiently exemplify this assertion. They are constantly increasing; they till no ground, and are incessantly employed in destroying each other, that they may not be destroyed by famine. Such was formerly the occupation of the Germans, Gauls, Illyrians, and all the ancient inhabitants of Europe, whose situation was exactly the same with that of the present inhabitants of Canada. They were perpetually at war with some of their neighbours; and, in a time of general peace, their assemblies authorized wars

amongst themselves; so that when their soldiers were not employed abroad, the people destroyed each other by civil commotions at home (i).—To introduce agriculture into these countries, without changing their manners and government, would be to increase the evil instead of affording a remedy. For as these people are divided into several smaller, independant, and vagrant nations, who consider robbery as lawful and honourable (k), they, who should apply themselves to agriculture, would be the more exposed to the violence of others; while, at the same time, they would be unaccustomed to arms; that is, to the only means of self-defence. The ancient Germans did not cultivate the earth, least, as they said, custom should give them a greater relish for this employ than for war, and least the strong should plunder the weak (l). They

(i) Pellontier's History of the Celts, tom. 1. p. 420.

(k) Cæsar de Bel. Gal. lib. vi.

(l) Cæsar, *ibid.*

had also a custom, which greatly corroborates what we have advanced: they converted all their frontiers into deserts, and interposed extensive wilds betwixt themselves and their enemies; in order, as they said, to take away every inducement to their settling near them; and to prevent also any sudden attack (m). This was certainly the most effectual method of keeping a people at a distance, who, for the most part, never waged war against their neighbours, but for a support. They also stored their provisions in caverns dug in the earth, not only to preserve them from the cold, but to secrete them also from the enemy. When an enemy arrives (says Tacitus upon this occasion), they seize whatever they can find; but they are either ignorant of that which is buried and secreted under ground, or return without it rather than take the trouble of seeking it (n).

Let

(m) *Cæsar de Bel. Gal. lib. vi.*

(n) *Si quando hostis advenit, aperta populantur:*

Let us stop here to make one observation, which whilst it confirms our ideas relative to the different effects of multiplication amongst the human species, may serve also to illustrate a point of history that stands in need of elucidation.

Europe was formerly in a situation very different from the present. Multitudes of Barbarians, whom the fear of their enemies was no longer able to keep in a posture of defence, upon the sea coasts and mountains of the North, made continual emigrations from their own habitations towards the southern countries, spreading destruction every where till they were themselves destroyed. Towards the fifth century they suppressed, and finally defeated, the Roman empire: they conquered France, Spain, Sicily, England; and at length, when they were satiated with

tur: abdita autem & defossa ignorantur, aut eo ipso fallunt quod querenda sint. Tacit. de Mor. Ger. c. 3.

blood

blood and spoil, and became willing to establish themselves in these parts, they suffered from their countrymen the same fate they had inflicted upon the first inhabitants. The empire of the Goths, which succeeded to that of the Romans in Italy, yielded in its turn to the Lombards. The Franks, who established themselves amongst the Gauls, suffered in the same manner from the Huns, Normans, and other Barbarians. In England, the Saxons, after having subdued the primitive inhabitants, were, in their turn, overrun by the Danes; and both of them afterwards submitted to the yoke of the Normans. For more than five centuries nothing was seen in Europe but a perpetual influx and reflux of people. Towns sacked, countries laid waste, empires overturned. As these inundations are no longer observed, a conclusion has been drawn that the human race is no longer so numerous as it was formerly. But this is meer conjecture. How was it possible
for

for uncultivated lands, in part over-run with enormous forests; in part deserts, inhabited by savage people (*o*), that gave the palm to all the fiercer virtues, and who held humanity as a contemptible weakness; how was it possible for countries, where their principal supply was from hunting, to contain a larger number of people than their present cultivated state would support (*p*)? It is indubitable that were the northern part of Europe in the same situation at present as it was formerly, it could no longer contain all its inhabitants than it did at that period. The Saxons, Danes, and all the people who inhabit along the coast of the Baltic, would be still necessitated to imitate their ancestors, and sally forth to cut the throats

(*o*) Terra si aliquando specie differet, & in universum tamen aut sylvis horrida paludibus foeda, Tacit. de Mor. Germ. §. 5.

(*p*) Terra multis impedita fluminibus, multis montibus aspera & magna ex parte sylvis aut lapidibus in via. P. Mele.

of their neighbours in order to procure a sustenance. The cause of this change in Europe is therefore to be ascribed to the progress which the arts and sciences have made since that period. In so uncultivated a state it could by no means yield supplies proportionate to the increase of the species. Every new generation, denied a sustenance by the country that gave them birth, were obliged to seek it elsewhere. And as they every where found the same plenitude of inhabitants, and scarcity of provisions, they saw themselves under a necessity of destroying others, or perishing themselves. From hence arose that ferocity of manners, those constant emigrations, ravages, and murders. "Warrior and robbers by inclination," says Mons. Pellontier, speaking of the ancient inhabitants of Europe, "they became so in some measure by necessity. Where men are ignorant of every art or employment; where it is dishonourable to live by labour, and no other trade

“ has been acquired than that of arms,
 “ they must inevitably want a multitude
 “ of necessaries in a time of peace. They
 “ must either submit to die of hunger, or
 “ kill and plunder others. This was
 “ formerly the honourable, and the only
 “ employ of the Spaniards, Gauls, Bri-
 “ tons, Germans, Illyrians, Thracians,
 “ Ligurians, and of all the people of Eu-
 “ rope in general (g).” Now the earth
 is cultivated, manufactures flourish, and
 by means of commerce and navigation,
 every country makes a mutual exchange
 of its superfluities, these invasions cease,
 every man finds employ and support at
 home: they are no longer compelled by
 necessity to sally forth, like so many hun-
 gry wolves from their retreats, and fall
 upon their prey. And if there are still
 some countries in Europe, where the pro-
 duce is not in proportion to the increase
 of the inhabitants, the consequences are
 no longer so injurious; as the surplus may

(g) Pellontier's History of the Celts, l. 2. c. 2.

go into foreign countries, where the arts and sciences afford them the means of support. Switzerland sends annually several thousand men into other countries: numbers also quit Germany. England alone is able, by means of its colonies, to drain off the superfluous inhabitants of Europe.

Yet it must be acknowledged, that although the arts and sciences collect and support great multitudes of people in those countries where they are cultivated, yet they accelerate their destruction also. The dangers to which some are exposed, the labours others endure, and particularly the excess of luxury and effeminacy which are constant attendants upon these improvements, are in reality so many powerful causes, which conspire to produce this effect. But we are not to conclude from hence, as a certain recent author has done, that the state of the inhabitants of Europe is less desirable than that of the Caribbees

Caraibees or Hottentots ; and that a man who cultivates the Muses is, upon this account, less happy than if all his knowledge was confined to leaping, running, fighting, slinging of stones, and climbing of trees ; than if his whole employment was to satisfy his wants, and lay down without further care, and sleep at the foot of a tree, like a dog or a swine, These are ideas formed at random from looking at the surface of objects only ; and consequently ideas which can never serve as a foundation for truth. The arts and sciences have, it is allowed, their inconveniences ; but are these equal to the advantages derived from them ? Are they to be compared with the evils that accompany the neglect of them ? Nay, are even these inconveniences destitute of utility ? And may they not serve to restrain that too great propensity to an immoderate increase of population, which would otherwise take place ? These are questions, it is obvious to every one, that ought to be
care-

carefully examined, before we can pass a final sentence upon their real and final consequences.

SECT. VIII.

Of the coercive Powers necessary to every Species.

LET us now return to our subject, from which we have digressed, in order to combat a system that does not deserve perhaps so much attention. We undertook to prove that, in certain circumstances, the human race is always injured by its own increase. And what we have remarked concerning the inhabitants of Canada, and of every nation in general where the arts and sciences are neglected, renders this truth indisputable. We have seen also, with respect to the other species, that if they were left entirely to themselves, they would all, without exception, increase to their own prejudice, as well as to that of others. We

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have.

have seen that a superabundance of any one species is sufficient to spread a general mortality over the whole animal System.

— Let us suppose for a moment, that all of them surmounted at the same time the obstacles opposed to their increase, and that they multiplied to an excess similar to that which has been known to take place in some particular species, what must be the consequence of this phenomenon? It is self-apparent that it would terminate in the total extinction of life, and that too in a very short time. It is therefore to the advantage of each species that there are obstacles to oppose their progress.

Providence has accordingly provided for the welfare of the animal system in this respect. Her first step has been to prescribe bounds to each species, which she does not permit any of its individuals to pass. Although this term is more remote in one class of animals than another,

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yet we may assert that it is of small duration with regard to those who live the longest. So that, whatever care an animal may take to preserve itself, whatever vigour it may possess at a certain age in life, there is a term it cannot exceed, and in proportion as this approaches, we see the animal change, weaken and vanish: like those fires which are kindled in the night, to burn no longer than the dawn of the morning. This first method that Providence employs to maintain a just equilibrium in the animal system, operates powerfully upon some particular species only. There are others upon which it makes little or no impression; so very extensive and sudden is their increase! With respect to these, Providence employs the inclemency of the seasons, during which they are either destroyed, or remain in a torpid state. And it is by these means alone that those terrible inundations are prevented, which must inevitably take place, if they continued to mul-

tively, perhaps a few weeks longer. It is also to set bounds to their increase, while they are in the height of vigour, that Providence has introduced into the World a multitude of Animals to feed upon their substance. And as the law of propagation in the frugivorous race, is superior in its effects to the law which decrees the extinction of each individual after a certain term, Providence to counteract these effects, so as to maintain the just balance, has also subjected them to the degradations of the carnivorous race.

It is then clear to a demonstration, that the introduction of the carnivorous race into the animal system, is by no means injurious to the other species, but that on the contrary, it is advantageous to them. For they are no more than the barriers nature has opposed to those inundations of which we have been speaking. And since these barriers are absolutely necessary, what can be more conformable to the rules of wisdom, than to employ

the living substance itself for this end? Thus does it act as its own counterpoise; and the excess of life in one species, serves to supply the want of it in another.

Compassion may aggrandize in our esteem the depredations which the different species commit. And a certain distrust of ourselves might tempt us to consider them as so many curses inflicted by a Superior dissatisfied with his works. But if we judge according to experience and facts, we shall have very different ideas. It is now five thousand years at least that the world has subsisted, and that men in alliance with lions and tygers have waged war against the other animals. For, with the permission of the poetic gentry, I believe that those times, those happy times, when men lived upon acorns, when lions and tygers were so courteous as to lick the feet of those that played upon the Lyre, never existed but in their brain.—It is, I say, five thousand years at least that one part of the living sub-

stance has waged continual war with the other, yet we do not find that this Law of Nature has to this day occasioned the extinction of any one species (r). Nay, we may add, it is this which has preserved them in that state of perpetual youth and vigour in which we behold them.

Without this wise and salutary Institution of Nature, life would long ago have broke through that just equipoise which is the only preservation of the different species, and must of consequence have suffered a total extinction. The effects of the carnivorous race, with respect to the other species, are exactly the same as that of the pruning-hook with respect to shrubs which are too luxuriant in their growth, or of the hoe to plants that

(r) No one species, says Mr. Ray, is as yet lost, that has been mentioned in history: and we may of consequence venture to conclude, that every one of them is preserved.

Ray's Wisd. of God in the Creat.
grow

grow too close together. By the diminution of their number, the others arrive at greater perfection.

S E C T. IX.

Of the Equilibrium established by Nature between the different Species in the Animal System.

OF so great utility is the Law of Nature, which enjoins, that one part of the living substance should feed upon the other, that it is the basis of the order and well-being of the whole animal system. We accordingly find that Providence has extended its empire over every species. They are all of them, from the smallest to the greatest, exposed to enemies ready to check their progress, and furnished with the arms and faculties necessary for this effect. To those swarms of Insects and reptiles that cover the surface of the earth, are opposed an army of birds, an active, vigilant, voracious

race, which seem created for their destruc-
 tion. Hares, rabbits, rats, mice, field mice,
 and all those animals, which multiply
 with so much facility, are exposed both
 to the deprivations of birds and quadru-
 peds, active as themselves in all their mo-
 tions, endowed with superior strength, and
 with a more penetrating eye. The amaz-
 ing bulk of the horned cattle, the light-
 ness of the deer, the strength and swiftness
 of the horse; all these qualities do not
 exempt those that enjoy them from
 this order of Nature. She has formed
 numberless other animals which possess the
 same faculties to a greater degree, and
 which employ them in the destruction
 of the former. The carnivorous ani-
 mals find in their turn, that the human
 race are furnished with numberless re-
 sources to check their increase, and pre-
 vent their multiplying beyond certain li-
 mits. Man is appointed to watch over
 all the other species, and maintain the ba-
 lance betwixt them. In this consists his

empire over the other animals. This is one reason why Providence has so closely united mankind together, and given them that understanding which she has refused to the rest of the creation.

SECT. X.

Of the Obstacles which oppose the Encrease of Population in the Human Species.

THIS superiority of the human species is so far a security at least from the devastation of the others, that none of them can be regarded as a sufficient check to its progress. Yet, since it is upon the human race, as well as every other, that nature has laid this injunction, "Increase and Multiply;" there is no doubt but we are also subject to that other law which regulates the limits of each species. And in fact, many are the obstacles opposing its progress: if the carnivorous animals are not able to effect any considerable diminution in the number of its individuals,

individuals, the human species frequently turns its force against itself, in order to avoid being overcharged with life. Men are frequently to each other, what the carnivorous race are with respect to other animals. Hobbes supposes that they are born in a state of warfare. This opinion, respecting individuals, is false: the organs, faculties, necessities, desires of men, every principle within them, shews that they are formed for society; and the more they are united in affection and goodwill, the nearer do they approach to a state of nature. It is false also with respect to civilized nations, and their mutual connections. For although the hatred, jealousies, distrust, and especially the national prejudices they harbour against each other, seem to countenance this opinion; such however are the resources civilized nations enjoy, by the cultivation of the arts and sciences, that they are never reduced to the cruel necessity of going to war. Those
 who

who seek it are instigated by a principle of ambition, vain glory, and revenge, more than by any other motive. But the case of those who neglect the arts and sciences, especially agriculture, is widely different. As the law of multiplication produces all its effects amongst these, without their being counterbalanced by luxury, or any other obstacle, it must of consequence excite wars. For where could those successive multitudes which appear in every generation find subsistence, did they not seek it by arms? Tacitus represents accordingly the ancient Germans as avowed enemies to peace (u). And Florus speaking of the Sarmatæ, says, they are ignorant of its very name (x). Quintus Curtius says also, that the ancient Scythians were always armed (y). It is true agriculture appears to us, who are civilized, as an art in the power of every

(u) Tacitus de Mor. Germ.

(x) Flor. lib. iv. c. 12.

(y) Quint. Curt. lib. viii. c. 7, 8.

man; but we have already proved that this is by no means the case. "Suppose your-
 "self alone," says *Mont. Montesquieu*,
 "and that you arrive by chance in a
 "strange country, if you find a piece of
 "money, be assured that you are in a ci-
 "vilized nation. Cultivation of lands re-
 "quires the use of money; it necessarily
 "supposes also, no small proficiency in
 "the arts and sciences. And we may
 "observe, that the arts, sciences, and
 "the wants of mankind, always keep
 "pace with each other (z)." A very
 sensible modern author is not less ex-
 plicit upon this article. When nations
 are intermixed, it is long before they be-
 come civilized, or even before their lan-
 guage is formed: some again are civilized
 sooner than others. A regular plan of
 government is established, and the arts are
 introduced with so much difficulty; revo-
 lutions so frequently subvert the rising
 edifice, that the greatest subject of won-

(z) *Esprit des Loix*, l. 18. c. 13.

der is, that nations in general do not continue to live like the Tartars (a). With respect to those people that do not cultivate the arts and sciences, we may admit the assertion of Hobbes, which Plato before him has, in his dialogues, put into the mouth of Clinias (b). "The state of civil society, respecting each other, is a natural state, that is a state of enmity; so that if a war should be discontinued, it is not, properly speaking, a permanent peace, but a suspension of arms." (c)

Amongst

(a) Voltaire's Hist. of the Ruf. Empire.

(b) Lib. 1. Prin. de Leg.

(c) De Cive. • The Christian Religion commands, if thy enemy hunger feed him, if he thirst give him drink.—Whoever shall smite thee on thy right cheek, turn to him the other also. And if any man will sue thee at the law, and take away thy coat, let him have thy cloak also; and whosoever shall compel thee to go a mile, go with him willingly. These are the injunctions of christianity, but upon whom are they enforced? Upon the disciples forming a civil government, and considered

with

Amongst other obstacles to an undue increase of the human species, we may consider famine and pestilence. These are terrible calamities; yet they are unavoidable, where men have too long enjoyed

with regard to the connection they might have with other civil governments? It would be a reflection upon the wisdom of its institutors to believe this. The primitive christians could not be considered in this light; and suppose this possible, the command would have been unreasonable. Societies undoubtedly owe to each other an exact observance of the laws of justice; but their tranquility and interest would not be greatly promoted by restraining them to these acts of extreme condescension, this depth of humiliation; and the impetuosity of human passion must be but little known to believe it possible. These maxims were addressed to men, who were to be dispersed over the earth, and who by their patience, moderation, gentleness, and humility, as well as by working of miracles, were to convert men to the christian religion, and to triumph over the malice of their enemy. They regulate the duties, not of communities, but of individuals towards each other, and in this sense they are full of wisdom and importance.

uninterrupted prosperity, and exceeded the proper limits of population. It is for this reason also, that Providence frequently intermixes with the common blessings of life, the miseries of war. War is doubtless terrible, but it by no means presents to our view, such a horrible spectacle as the plague or famine. Human nature can only oppose sighs and groans to these evils, as it is not in her power to govern those secret and invisible agents, I mean the second causes, which occasion them. But as war is the machination of men, they know the best or the worst consequences it can produce, and may prepare for the event. If a nation is attacked, violence may be opposed by violence, rapine by rapine, slaughter by slaughter, and in the transport of their rage, men feel not the blows they receive. When a Hero falls in battle, the *dulce & decorum pro patria mori*, or some other animating motive, affords him consolation: so that a secret satisfaction shall be intermingled with his sufferings.

ings. Who can forbear admiring the Roman fathers, who after the fatal battle of Clusium, not being able to retire to the capitol, voluntarily submitted themselves to death, and expected its approach in the utmost tranquility, seated upon their thrones of ivory, and clothed with all the ensigns of dignity? Who does not admire the conduct of Regulus? After having advised the Roman Senate to reject the terms proposed by Carthage, he tears himself from the arms of his wife and children, and returns to Carthage to suffer the punishment this cruel people had prepared for him (a). Any one that reads the history of Canada, will find to what a de-

(a) *Fertur pudice conjugis osculum,*

Parvosque natos, ut capitis minor,

Ab se removisse & virilem

Torvus humi reposuisse vultum;

Donec labantes consilio patres

Firmaret, neque nunquam illis datus

Interque morantibus amicis

Egregius properaret exsul.

Hor. Od. l. iii. od. 5.

gree

"the nature adapts men to that kind of
 life, they are destined to pass. These peo-
 ple being always engaged in hunting and
 war, and having every thing to fear from
 the barbarity of their enemies, should they
 fall into their hands, are the most patient
 and most courageous of mortals, in the
 midst of their sufferings. "Nothing is
 "more common," says Charlevoix,
 "than to see persons of each sex, and
 "all ages, suffer for several days together
 "all that anguish which fire can excite,
 "or which busy rage can invent to ren-
 "der it more excruciating, without let-
 "ting a sigh escape them. Their only
 "employ, even in the midst of their
 "sufferings, is generally to exasperate
 "their executioner, by the most cutting
 "insults (e).

This was the character of the Europeans
 also before they were civilized. They
 exercised a similar cruelty towards their

(e) Charlevoix Journal Hist. tom. vi. let. xi.

I

prisoners,

prisoners (*f*), and those who had the misfortune to fall into the hands of their enemies, shewed a similar fortitude in the midst of their tortures (*g*).

(*f*) Nihil interius per omnia id tempus residuum crudelitatis fuit in captivos sœvientibus. Litare diis, sanguinem humanum bibere in ossibus capitum, & cujusque modi ludibrio sædare mortem tam igni quam fumo, partusque gravidarum extorquere tormentis.

Flor. l. iii. c. iv.

Galli in Callienses dira & omnium, quæ unquam ad aures nostras pervenerint, atrocissima edidere facinora.

Pausan. Phoc. xxii. p. 831.

(*g*) Ex captivis Sogdianorum, triginta nobilissimi corporum robore eximio perducti erant. Qui, ut per interpretem cognoverunt, jussu regis ipsos ad supplicium trahi, cæmen lætantium more canere, tripudiisque & lasciviori corporis motu, gaudium quoddam animi ostentare cœperunt.

Quint. Curt. l. vii.

Et illud etiam desipientiæ Cantabrorum tribuunt, quod nonnulli capti & in crucem notæ pœanas canebant.

Strabo, l. iii.

The

The cultivation of the arts and sciences prevents wars, prevents famine, and perhaps it may, to a certain degree, prevent the plague, by those changes it introduces in the manners of men, in their dress, dwellings, food, and general method of living, particularly by cleaning the soil, which gives a free circulation to the air, and of consequence renders it the more salutary. But although the arts and sciences may banish, in some measure, these evils, yet they introduce others, which are no less influential, tho' they are not so sudden in their effects. Such as luxury, effeminacy, sensuality, debauchery, which are so many impediments to a detrimental increase of the human species. Nature is simple and uniform in its course; this being the only means of promoting the interest of mankind. To precipitate its course, is to expose it to numberless evils, it is to destroy it. But luxury, effeminacy, sensuality, change the course of

nature by creating new desires, and loading it with superfluous cares. Those who give themselves up to these vices, it is certain, cannot escape with impunity; and when we reflect how much the constitutions of children are influenced by those of their parents, we may with justice exclaim *non his juvenis ante parentibus*. It is not from the offspring of such parents, parents enervated by effeminacy, and ruined by debauchery, that the propagation of the human species is to be expected.

Another inconvenience also attends a cultivation of the arts and sciences. That studious and sedentary life to which numbers are destined, has no less power in exhausting the animal spirits, and destroying the health, than the causes we have already mentioned. And what shall we say of those laborious and pernicious employments, of those many dangerous professions, which spring from this source? Such as, for example, working in mines,

navi-

navigation, travelling into foreign countries.—Thus if we duly consider the effects produced by the arts and sciences, we shall find that notwithstanding they contribute, in some respects, to the increase of the human species, yet in others, by spreading a secret poison, they retard their progress, and serve as correctives to the excess of population, that must otherwise arise from the peace and tranquillity which the arts and sciences introduce. And since their effects are without violence; since they do not disturb any established order, and since they are scarcely perceived, we conceive them as harmless, compared with pestilence, famine, and war. Calamities these, which must inevitably be the lot of a people that neglect to cultivate them.

So true is it that nature has prescribed limits to the propagation of men, that they have sometimes exceeded her intentions in this respect, and imposed laws

upon themselves to check the increase of population, which nature has never enjoined: " In China and Tonquin parents
 " are permitted to sell or expose their
 " children. In the island of Formosa,
 " their religion prohibits women from
 " bringing forth children till they are
 " about 35 years of age. Before this period
 " the priestess finds means to procure an
 " abortion. The same effect (says Mons.
 " Montesquieu, from whom I have borrowed this article) (b) which physical
 " causes produced in some of the eastern
 " countries, took place in Greece from
 " the nature of their government. In
 " a small and flourishing territory, the
 " number of citizens must soon augment,
 " so as to become a burden. This people
 " of consequence omitted nothing
 " which might prevent an undue increase
 " of children. Their politics were more
 " immediately confined to the regulation
 " of the number of citizens. Plato limits

(b) *Esprit des Loix*, tom. ii. c. 16, 17.

“ it to five thousand and forty, and
 “ recommends, according as the case may
 “ require; either the prohibition or en-
 “ couragement of propagation, by mo-
 “ tives of honor or ignominy, and by the
 “ seasonable admonitions of the elders.
 “ He advises also a regulation of the
 “ number of marriages, in such a manner
 “ that the losses of the republic may be
 “ constantly repaired, without its being
 “ burdened with members. Where the
 “ laws of the country forbid the exposing
 “ of their children, says Aristotle, every
 “ parent should be limited to a certain
 “ number. And when the children are
 “ more numerous than the laws permit,
 “ he advises the women to procure abor-
 “ tion before the foetus be endowed with
 “ life. Aristotle further observes, that
 “ there are countries where the laws ad-
 “ mit strangers and bastards, or children
 “ whose mother only was a free woman,
 “ into the number of citizens; but when
 “ they are sufficiently numerous, this

"privilege is suspended." The savages of Canada burn their prisoners: but if they have any empty cabins to dispose of, they give them to their captives, and acknowledge them of their nation.

What we have alledged sufficiently proves, that Providence has subjected men as well as other animals, to that law of nature, which sets boundaries to the number of individuals in every species. She has not exposed men to the fury of the brute creatures, but she has divided them into distinct bodies, which are constantly clashing against each other, and which always lose some of their bulk by their reciprocal attrition. She has also subjected them to various coercive causes, one or other of which is continually acting upon them, in every situation, and prunes off those luxurious branches, that are injurious to the animal, as well as to vegetative life.

We

We have enlarged the more upon this truth, as it is here principally that our system opposes the opinions generally received. To show men the constant and uniform action of certain causes in the inferior parts of the animal creation, is sufficient to make them comprehend the designs of Providence in the operation of these causes. But when we speak of the effects produced upon themselves, they are with difficulty convinced that Providence has destined them to the very same end. The testimony of their eyes and ears are, in this respect, confronted by the decisions of a judge, to which they pay a greater deference still; I mean their pride. They cannot be persuaded that beings, endowed with intelligence, and designed to be the masters and governors of other animals, should be joined with them, in subjection to those laws which regulate and confine the number of individuals of every species. But as long as they give themselves

themselves up to such ideas, they must be blind to the order, beauty, and excellence of the animal system : they will discover nothing but disorder and confusion, as they will find every phenomenon that takes place, directly opposite to the conceptions they have entertained of infinite wisdom and goodness. Let them, on the other hand, acknowledge their dependence upon the general laws, which nature has established for the production and conservation of an immense quantity of life in the universe ; let them only acknowledge, that with the powers of propagation, which they enjoy in common with all other species, they must be subjected to the same consequences, and they will find those imaginary irregularities vanish, that are such obstacles to their faith ; they will find that the wars, disorders, infirmities, and accidents, to which they are exposed, and by which such numbers are daily cut off, have, besides the moral reasons we might mention, physical ones, also, that sufficiently

ciently justify their introduction in the world.

SECT. XL.

Particular Instances given of this coercive Power in the Animal System.

THERE is no species, I believe, but what stands in need of this coercive force, to confine it within its proper boundaries. This is a necessary consequence of that law of propagation which was given to all; and the various phenomena to be remarked in the animal system, unite to support this supposition. Nature employs various powers, which oppose, in every species, the pernicious increase of their individuals. Men she has subjected to wars, pestilence, famine, disease and infirmities. The carnivorous animals, which she has put under the dominion of men, are appointed in their turn to serve as a barrier to the undug multiplication of the frugivorous race. And some of them discharge this office with

with so much cunning and address, that they clearly discover this to have been the design of Providence in their formation. We have already given some examples; we will add some others, that we may place this important truth in the most conspicuous point of view possible.

“ The crocodiles,” says Don Ulloa, speaking of the river Guayaquil, “ are
 “ most destructive enemies to the fish
 “ which this river produces; they chiefly
 “ feed upon them, and catch them with
 “ as much artifice as the most able fisher-
 “ man. Eight or ten of them combine
 “ together, and place themselves in a line
 “ across the mouth of a river or canal, so
 “ that no fish can pass without becoming
 “ their prey: yet they are obliged to make
 “ the attempt; for while this eight or
 “ ten watch at the mouth of the river,
 “ there are others that drive the fish be-
 “ fore them down the stream. When
 “ they are destitute of fish, and pressed
 “ with

" with hunger, they seek the land, and
 " frequent the plains bordering upon
 " some river or brook: calves and young
 " colts are not exempt from their fury;
 " and after they have once tasted of their
 " flesh, they retain such a relish for it,
 " as not to care any more for fish. They
 " now hunt after men and other animals;
 " they fall by forth when it is dark, and
 " surprize their prey under covert of
 " the night.

" As alligators are oviparous animals,
 " and the female lays upwards of a hun-
 " dred eggs in the space of a day or two,
 " their multitudes would in a short time
 " depopulate the places they frequent of
 " every other inhabitant, did not Provi-
 " dence interpose a restraint, by rendering
 " them, in their turn, tributary to other
 " species. When the female wants to lay,
 " she comes on shore, and deposits her eggs
 " in a hole which she digs for that purpose
 " near the borders of the river; she then

“ covers them with sand, and has the pre-
 “ caution to roll over the place itself and
 “ the parts adjacent, in order to conceal
 “ the more effectually the spot where
 “ they are repositied, and disconcert the
 “ enemies of her species. Having thus
 “ provided for their security, she returns
 “ to the water, and leaves them to
 “ quicken until the time that nature has
 “ taught her it is necessary to hatch them.
 “ She then returns with the male, re-
 “ moves the sand, finds the eggs, and
 “ breaks their shell. The young allé-
 “ gators immediately come forth, and
 “ they are so secure from accidents, that
 “ scarce a single egg shall be lost in a
 “ whole brood. As soon as they are
 “ hatched, the mother takes them upon
 “ her back, and about her neck, and
 “ makes to the water with this new
 “ race : but in the mean time the galli-
 “ nazo, always upon the watch, carries
 “ off some of them, and the male also
 “ devours as many of them as he can
 “ catch.

" catch. The female herself destroys
 " those that are separated from her, or
 " are that not able to swim : so that there
 " shall scarce be five or six remaining
 " out of so numerous a brood.

" These gallinazos are no less ac-
 " tive and cunning in destroying the
 " race of crocodiles, than the latter are
 " in catching fish and other animals.
 " They are particularly fond of their
 " eggs, and employ amazing dexterity
 " to seize them. At the season that the
 " female deposits them by the side of the
 " river, they stand sentinel upon some
 " adjacent tree, and hide themselves a-
 " mongst the branches and leaves so as
 " not to be seen : they permit her to lay
 " her eggs without molestation, nor do
 " they so much as interrupt her precau-
 " tions to conceal her treasure : but the
 " moment she turns her back, they pitch
 " upon the nest, and by means of their
 " bills, claws and wings, uncover the
 " eggs,

" eggs, which they instantly devour —
 " Let us admire the wisdom of Provi-
 " dence," subjoin this excellent author,
 from whom we recite these peculiarities;
 " let us admire the wisdom of Providence,
 " which has given to the male crocodiles
 " this propensity to devour the young,
 " of which they are the parents, and to
 " the gallinazos such a desire after the
 " eggs of the female. Without this,
 " neither could the waters or the plains
 " be able to contain the number of cro-
 " codiles, that would be produced from
 " such a quantity of eggs; for notwith-
 " standing the destruction made by the
 " one or the other, it is impossible to
 " conceive how many still remain (i.)

There is in the American islands a bird,
 called frigate, which intercepts the flying
 fish in that short interval it is out of the
 water. What strength, address and acti-
 vity must be necessary for this purpose!

(i) Voyage de Don Ulloa, liv. v. chap. 9.

Nature has accordingly endowed it with a particular formation, with a large bill, very much arched and crooked at the extremity; eyes remarkably piercing, legs short and collected; feet armed with stiff and crooked claws, its wings are long, but very light; with these it skims along the surface of the water with an astonishing activity. This bird, says Father Labat, is found in the middle of the ocean, three or four hundred leagues from land, which demonstrates its incredible strength, and astonishing agility; for as it does not float upon the water like other aquatic birds, it must of consequence fly seven or eight hundred leagues before it can repose itself (k).

It is well known also that the whale, whose amazing strength and bulk seem to secure it from the insults of every other animal, is, notwithstanding, exposed to the fury of the sword-fish, which nature ap-

(k) Nouveau Voyage du Pere Labat, tom. viii.

seems to have formed with an immediate design, to act as a check upon it. This animal has, at the extremity of its snout, a strong, hard, horny projection, armed on each edge with straight points of the same substance, in the form of flat, strong, and sharp teeth, which are from fifteen to eighteen lines in length near the snout. With this instrument it boldly attacks and encounters the whale wherever it meets with her. I have often had the pleasure, says father Lebat (1), of seeing their combat. The tail of the whale is its only defence; with this it endeavours to strike its antagonist; and is sure that one blow would be sufficient to destroy him. The other, as he is more active than the whale, easily parries the stroke, and springing into the air falls upon her, and attempts, not to pierce her with its snout, but to cut or saw her with the teeth that arm it; and whenever he succeeds, the sea is dyed red with the blood issuing from the wound.

(1) Nouveau Voyage, tom. vi. p. 250.

The fury of the whale may be learned from the vehemence with which it lashes the water; every stroke of its tail resounding like the report of a cannon.

To these examples, taken from other countries, let us add that of the Rook, which we have before us, and which is not uninteresting. The Rook is a species of Crow that feeds upon worms, and particularly the worms produced from the eggs of the May-bug. As these, and all the winged insects in general, are to be supported by the roots of plants, they deposit their eggs pretty deep in the earth, in a hole they dig for that purpose. The worms and caterpillars, upon which the Rook feeds, are not exposed to the mercy of this bird till the earth is thrown up. Hence it is that Rooks always frequent lands recently cultivated, that the sight of the husbandman with his plough, puts them in action, and that they search with

so much assiduity about furrows newly formed.

Some years ago the farmers, in one of the principal counties of England, entertained a notion that these birds were prejudicial to the grain; and they determined, as if with one accord, to extirpate the race. The rooks were every where persecuted; their nests demolished; their young ones destroyed. But in proportion to the decrease of this animal, they found themselves overrun with swarms of worms, caterpillars, butterflies, and bugs; which attached themselves to the grain, trees and fruits, and occasioned greater desolation in one day, than the rooks would have done in the space of a twelve month. Many farmers were ruined. At length this persecution ceased; and they found that in proportion as this race of animals was restored, the scourge which their destruction had occasioned, ceased likewise.

Several

Several small birds, particularly the wren and titmouse, may be seen during the winter-season in gardens, pecking at the buds and branches of trees. It is to this little animal, that nature has entrusted the charge of suppressing the progress of worms, which feed upon fruits, and which are soon spread every where when the heat of the sun revives them in the spring. Thus has nature her reasons for every thing, more especially for the place she has allotted to each species in the animal system. There are none but what have their peculiar utility, either by affording nourishment, or serving as a barrier to some other species. Their assemblage forms a complete whole, which supports itself by the reciprocal balance of its parts. By extirpating one, you hazard the interest of all. For those which appear to us the most useless, may, without our knowing it, serve as obstacles to the injurious increase of insects, or of some other pernicious race.

We see therefore that nature, however she may be lavish of the life of individuals, has taken particular care for the preservation of every species. She has given a most amazing fecundity to all, but especially to those that supply the wants of others. She has joined to this, a wonderful sagacity to discover, and address to escape the snares that are spread for them. She has, in consequence, provided a variety of retreats, by diversifying the surface of the earth with numberless woods, forests, mountains, and inaccessible rocks. But, what is yet a stronger indication of the care of nature in this respect, is those sentiments of compassion with which she has, in some measure, mitigated the dominion of man over the other animals. Man alone is rendered capable of these feelings, as he is the only creature on earth upon whose will the preservation, or total ruin, of a multitude of species finally depend. It is a mistake to imagine that our compassion is confined

to the miseria of our own species. These
are animals that cannot exist without our
assistance: and to these nature has given
a soft and pliable disposition, mild and
humble manners, looks full of benignity
and innocence: in a word, an assemblage
of those affectionate qualities, which are
most proper to awaken in us the feelings
of compassion. We cannot doubt a mo-
ment then, whether nature has formed
these animals to share with us the sweets
that flow from this benevolent disposition.
We accordingly are attentive to their
wants. Their sufferings and groans im-
press uneasy sensations upon ourselves,
which we cannot remove but by giving
them relief. And, when the principle of
self-preservation obliges us to exert that
authority we have over them, we are sen-
sible how just it is to shorten, as much as
possible, the pains necessarily inflicted.

K 4 PART



PART THE THIRD.

IN WHICH

Some Objections that may be made
to the Sentiments advanced in this
Work, are answered.

SECTION I.

*The World is governed by general Laws;
The Nature of these Laws.*

IT is with this law of nature which
ordains the destruction of one part
of animal life, for the good of another,
as it is with every other law Providence
has established to maintain the order of
the universe. It may not at all times per-
fectly correspond with the good of indi-
viduals,

viduals, yet it is wise, just, and equitable, with respect to those beings themselves whose happiness it seems most to oppose. This truth it is difficult to comprehend, because men in general comprehend nothing beyond the sphere of their own private wants. To this contracted point of view are all the speculations of the sceptic confined; and hence it is that he sees nothing but disorder and confusion in the plan of the universe. To this contracted point of view are confined also the meditations of every religious man, that is wedded to a system, and who of consequence, whenever he reflects upon the ways of Providence, is as blind to their excellence and justice as the infidel or atheist. And the better to shield himself from their attacks, he is obliged to wrap himself up in his ignorance; to call every thing, even the most obvious truths, mysteries, beyond the powers of human reason to penetrate. Let us leave these characters to agree as well as they can; we

we are not to expect the heads of such
should become the repositories of truth.

Since what may be beneficial to the
whole, does not always promote the in-
terest of a part, considered as unconnected
with the whole ; since universal and par-
tial good, are in a certain sense distinct
objects, and not to be acquired by the same
means ; it is impossible but that general
laws, laws that have the conservation of
the universe itself, and consequently of an
infinite multitude of beings, for their ob-
ject, should at times oppose private in-
terest, or the interest of a part considered
as distinct from the whole : and since the
preservation of the whole, is certainly to
be preferred to that of a part, the general
laws of nature ought to be, for this rea-
son, fixt, immutable and perpetual. No
creature can infringe upon these laws,
without a particular permission from
him who established them. He alone
is equal to this, who holds the reins
of

of the universe, and can with a firm and steady hand direct every event and every circumstance to one general and determined destination. To expect that God will suspend the operations of his laws, every time they clash with the interest of individuals, is, of all absurdities, the greatest. What! because the waves of the sea are in danger of overwhelming some unthinking wretches that expose themselves to its mercy, shall his spirit cease to move upon the waters, cease to communicate to them that perpetual agitation which is so needful and salutary? Shall he suppress the impetuous winds, and forbid them to drive before them the contagious vapours, because an unfortunate mortal, or a whole family, are upon the point of being buried under the ruins of some edifice? Shall he forbid the thunder to roar, the rain to swell the torrent, the hail to lay waste the fields every time intimidated creatures shall expose their relics, or make vows and processions
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for this end? Doubtless, not. It is upon the constant and uniform action of these laws that the conservation of the universe depends. Was it just to suspend for once only their effects, in favour of an individual, they must be suspended for all. The whole would perish, and the individual with it. These laws therefore never deviate from the path prescribed, except in cases that concern the whole world, and affect, as it were, an intire change in it. Do we not find that second causes, which are no other than these laws themselves, are stubborn as iron and brass, with respect to us, whenever the general destination of things runs counter to our private interest? And what would become of societies? what would become of the world itself, if by our vows and tears we could effect the least change? Does not one half of mankind beg of God to be deaf to the prayers of the other? Does not this nation burn incense upon its altars, does it not offer its sacrifices to the Supreme,

Supreme, to influence him to change the songs of triumph, another nation is uttering, into cries and lamentations? Should Providence make the wishes and desires of individuals the rule of his conduct, those general, immutable laws, that wonderful order which reigns in the universe, would soon give way to trouble and confusion: that universal joy and satisfaction observable in the animal creation, would soon be changed into universal consternation and despair.

Let earth unbalanc'd from her orbit fly,
Planets and suns run lawless through the sky;

Let ruling angels from their spheres be hurl'd,

Being on being wreck'd, and world on world;

Heaven's whole foundations to their centre nod,

And nature trembles to the throne of God.

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All this dread order break—For whom?
For thee?

Vile worm!—Oh madness! pride! impiety (n)!

It is reasonable that the good of a part should be subordinate to the good of the whole; and of consequence that second causes should not be in the power of individuals. But which way, it may be said, will these reflections obviate an objection, that naturally arises from private evils, occasioned by this general law of nature under consideration? For however Providence may have tempered its severities, it still occasions, some will say, the misfortune of numberless individuals, and often of whole species themselves. How often have not the carnivorous animals totally depopulated the places they frequent of every other inhabitant? How often, in the human species, have not the yoke of

(n) Essay on Man, epist. 1. l. 251.

conquerors become beyond measure insupportable to the necks of the conquered. We are not ignorant of the facts which gave rise to these objections; but we assert that none can be alledged that is not a partial evil, none that is not confined to the events which take place in some circumscribed part of the globe or ether, and that for a limited time only: and consequently none which can serve for a general and decisive rule, with respect to the point in question. Let us collect the effects of this law, and consider their universality, not only as relative to the present instant, but to futurity; not merely as respecting a few individuals, but every species in general; and if upon this examination we should find that it is more prejudicial to life than productive of it, that it occasions more confusion than regularity, more pain than pleasure, more misery than happiness, we need not hesitate to call it unjust and absurd. It cannot be the work of a being

transcendently good. But if we should find the number it injures is small compared with the whole, that the partial evil it occasions becomes productive of general order, harmony and enjoyment, and what is more, the increase of life, we must doubtless draw the opposite conclusion.

S E C T. II.

Nature is not chargeable with Cruelty in the Wars she excites among st Animals.

BUT you will object, thus to expose one animal to the fury of another is cruel. It is cruel above all to lay mankind under the necessity of destroying, or rendering each other miserable. The lot of animals would doubtless be deplorable were they endowed with reason, like ourselves, and could they foresee at a distance the evils which threaten them; but nature has cautiously hid these from their sight, by giving them inferior degrees of intelligence. And those of them which have so much sagacity as to apprehend danger,
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are accordingly endowed with a double portion of activity and address to avoid it. They have also their places of retreat. All these advantages inspire them with confidence (c). Monks and women consider the military class as the most unhappy of men, because placing themselves in their situation, they judge of it by their own timid dispositions. Thus again, when we would judge of the state of the other species, which depend upon us, we place ourselves in the same situation, and carrying with us all our knowledge and foresight, we conclude that they lead a

(c) There are some animals that make use of centinels; and with this precaution, they will calmly venture to gather their food in the midst of their enemies. For this reason have the Spaniards given the name of *Preacher* to a certain bird in South America. Wherever these birds flock together, one of them is always observed to place itself upon an eminence, and seems by the noise it makes, to be continually haranguing its brethren; but in fact it has only taken this station to prevent any sudden surprize.

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miserable life. But the truth is, being destined to an end different from ours, they are neither endowed with our penetration nor sensibility. The lamb, which the wants of its master condemn to bleed to day, continues nevertheless to skip about, and browse the tender herb: he is happy and contented to the last. He resists the hand armed for his destruction; and the blow it receives comes like a thunderbolt, unexpectedly falling upon some devoted head (p).

With respect to wars, we have already observed that nature has mitigated their horrors by intermixing with the agonies they create in the mind, the sentiments of anger and revenge, or a thirst for glory, that danger awakens, and that ren-

(p) The lamb thy riot dooms to bleed to day,
Had he thy reason, would he skip and play?
Pleas'd to the last he escapes the shaggy food,
And turns the hand that slays to feed his blood.

Pope's Essay on Man, ep. 6. l. 22.

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ders men superior to all the evils wars bring with them. But after all, if they prove the occasion of wretchedness to some, the misery of such is no more according to the intension of Providence, than the pain which accompanies any operation upon the human body, is in that of the fargason. They are no more than victims, which, after having enjoyed their portion of the sweets of life, suffer for the general good. Things, according to the actual state of affairs, cannot be otherwise. Should any one still doubt of this, let him reflect that the law of propagation respects man as well as other animals, and let him consider the effect which this law necessarily produces. I see no necessity, you say, why animals should devour each other, much less that men, in whatever circumstances they may be placed, should mutually take up arms to destroy each other. Well then, abolish this law of nature, and revive in your imagination the golden age of the poets. Let univer-

sal peace and harmony succeed to those wars, which incessantly disturb the repose of nations ; let swords be changed into plow-shares, and spears into pruning-hooks : instead of staining the earth with human gore, let them serve to render it as fertile as possible. Let ravenous beasts, forgetting their natural fierceness, cease to persecute the other species, and using their teeth to crop the grass, let them browse in the meadows with sheep and goats. In a word, let all the animals enjoy a profound peace : let them with one accord, and in perfect security, make the forests and mountains resound with the praises of their Creator. Aye, this you say is the state in which the world ought to be, and in which it would have been if—
 Senseless and stupid mortal ! Ye would remove trifling evils, and you introduce the most enormous ! Ye would preserve some useless individuals, and ye destroy the whole ! As each species would no longer experience the obstacles proportionate
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to the effects of their increase, a universal inundation would ensue, threatening speedy destruction to the whole animal system. This perfect calm, this universal and uninterrupted felicity they wish to introduce into the world; this beautiful chimera, will always appear possible to those who judge of things according to their imagination only; but every one that forms a right judgment; will see that the earth was never designed for such a state.

S E C T. III.

The Law of Multiplication is absolutely necessary in the Animal System.

BUT if these are the consequences that necessarily follow the law of multiplication, why (it may be objected) does such a law exist?

1st, Because it introduces into the world a much greater abundance of life than

what could otherwise take place. The carnivorous animals could not subsist without the frugivorous, and these would be extinguished by the depredations of the other species, were they not remarkably prolific. But let us place this subject in a stronger point of view,

2dly, Without this law of multiplication animal life cannot exist, or could exist for a short period only. Life is no other than a web of curious texture, wrought with soft, weak, fragile, delicate materials, forming all together a piece admirable in its construction and destination, but for this very reason subject to ten thousand accidents. To imagine that life could subsist without such an assemblage, is to confound it with the existence of pure intelligences; to imagine that Beings formed upon these principles, could perpetuate their own existence without successive generations, is to attribute to them contradictory qualities. Poets have dreamed

fury. A race whom our seas could not overwhelm, nor our mountains bury under their enormous bulk. But such a race would necessarily require a world large in proportion, or it could not contain them. Whatever size therefore we may attribute to the individuals of the animal system, it must be as nothing compared to the world they inhabit; and their power compared with second causes, which animate the world, must be as less than nothing.

Animal life, therefore, necessarily supposes beings that cannot perpetuate themselves without re-production in successive generations. And as they are exposed to numberless disasters, which might sweep away multitudes before they had obeyed the laws of nature in this respect, it is requisite that their re-production should be more than simple. Was it the established order that no more than two should spring from two, it is evident that such a number would not be sufficient to perpetuate any

any one of the species. For it is natural to imagine, that some time is to elapse betwixt the birth of an individual, and its re-production ; but should they be destroyed during this interval, the loss of the species would be irreparable : and as these losses would unavoidably be repeated, they must, at length, occasion the extinction of the whole race. There is no danger of exaggeration in asserting, that it is necessary that such a re-production should be six, ten, a hundred fold, or sometimes more, according to the nature of the species, and the particular circumstances of their situation, that the generation it produces should follow each other in swift succession, so that whenever any species suffers a considerable loss, by those catastrophes which happen in the world, it may be speedily recruited, and leave no void in the scale of existence. This also shews the intention of Providence in confining the existence of every individual within such contracted limits.

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For as the natural frailty of animal life renders the increase of individuals necessary, this increase makes it necessary in return to shorten the space of their existence. For should it extend beyond a certain term, it is plain that this law of multiplication would prove, for the most part, too luxuriant in its effects, that is, it would produce pernicious effects. Tho' the devastations which war, disasters, diseases, infirmities, occasion, are at certain seasons immense, and more than what is requisite to check the undue increase of any species, there are other seasons in which they produce not these effects. And since Providence governs the world by general laws, since the events which take place in it cannot contradict these laws, but prove subordinate to them, it is necessary, besides the coercive laws which oppose this undue increase of the species, that there should be some general one which limits the existence of every being to a certain period. The law of multi-

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plication, and such a period of existence as would render this multiplication excessive, are absolutely incompatible. It is also probable (observing a distinction however betwixt terrene and aquatic animals) that the term of existence natural to each being, is according to the produce of this multiplication compared with the time allotted for its repetition. Providence has permitted but a few moments of existence to those insects which are hourly renewing their generations. Those quadrupeds and birds that soon become capable of propagation, arrive at the end of their course by the time that other species, less prolific, have scarce entered upon theirs. This law is particularly obvious in domestic animals. The canine race, cats, hogs, seldom exceed a dozen years, whilst horses, asses, cows, live, according to the common course of nature, to a much longer period. Men, who require a certain number of years before they are ripe for propagation, and consequently

quently multiply slower, enjoy a much longer extent of existence than is granted to almost any other animated being,

S E C T. IV.

Advantages resulting from the Law of Multiplication.

LET us make one observation more upon this law. As it maintains life in all its plenitude, so does it multiply the pleasures of life. By what other name shall we call those tender affections, and those returns of tenderness still more endearing, which all experience that are under its dominion. It enkindles warm desires in the heart, but these very desires render the heart susceptible of higher degrees of felicity. They are the parents of pleasing illusions, which raise weak and feeble mortals to the rank of gods. From hence arise looks full of tenderness and love; attachments the most sincere and
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disinterested; mutual intercourses which are the delights of life; and hopes that are its chief support and sovereign balm. It is, I acknowledge, the parent of cares also; but it renders even these pleasing and delightful by the tender concern it inspires for the happiness of those who are the objects of them; and where it exposes to troubles, it renders them supportable by the advantages that result from them. Can any thing be more delightful than the connection established betwixt animals of the same species? From hence those bonds of love uniting individuals together, so as to render them as one; from hence the reciprocal intercourse of assistance, consolation, offices of friendship on one side; and, on the other, gratitude, esteem, and love. Let us never complain of nature: all her laws are formed for our happiness; but this is the more immediate characteristic of that law which enjoins the multiplication of the individual of each species. Through its benignant

nigant influences, men, as well as the rest of the animal creation, forget their pains, forget their weakness; frequently does wretched man forget the miseries of his state, and compare his felicity with that of angels!

In short, the desires and hopes which are implanted by this law are, as we have just observed, the sovereign balm and support of life. Of what are not those capable who are animated by their insatiables? They give strength to the weak, courage to the timorous, activity to the indolent: they tame the savage, and stamp a degree of fierceness upon the most placid natures: in a word, they mingle with all the passions of the mind, and communicate to them a certain dignity and grandeur. They have produced, amongst the human race, the most heroic actions; and where they may not be the immediate cause of the most shining virtues, they have at least a peculiar influence

ence in disposing the mind to perform them. There is a certain period of life when the minds of men are unusually open to the feelings of benevolence, generosity, and compassion, and it is when this law reigns with sovereign power in the heart. There is a season, when the heart of man contracts, when its noblest efforts do not exceed the performance of some partial virtues; it is when this delightful flame begins to be extinguished.

S E C T. V.

General Reflections upon what has been advanced.

WE cannot doubt but that whatever the Deity has done, is well done.

We acknowledge this truth, not because others have acknowledged it before us, but because it shines with unclouded lustre, in that order and beauty which reign in the system of the universe, and because

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this homage is due to him whom we believe, and who is in fact, Supreme Goodness itself.

There is a certain determined end in which all the designs of nature are centered; this is the production and conservation of life; and all beings agree to acknowledge that life is a blessing. Those signs of joy and gaiety, manifest in all their motions, in every attitude, and in every tone of voice, prove that life has its sweets for all, even the lowest class of animals, and that they are capable of enjoying them. Men in particular do justice in this respect to the gift of their Creator: they love the life he has conferred, and watch over it as their greatest good. If there are some ulcered souls that regard it as a burden, and delight to represent it in this view, their judgments ought not to counterbalance that of mankind in general; their voice should not silence the voice of nature. Let them

compare the seasons of health with those of sickness ; the moments of pain to hours of ease and pleasure ; the days of bitterness and woe to those in which they are free from their attack ; let them confront the few unfortunate with the thousands of millions of happy creatures, and then decide whether the measure of happiness does not greatly exceed that of misery. Life, we say, is a blessing ; and it is the will of the Creator that innumerable multitudes enjoy this blessing. Amidst a variety of other worlds, he has created this we inhabit. A world diversified with mountains and plains, refreshed with rivers and lakes, enriched with plants and trees, warmed and enlightened by the rays of the sun ; a world, where invisible causes preserve, in perpetual circulation, the elements impregnated with every principle of life ; where the vegetables, by secret powers still more mysterious, attract and collect these rich treasures of the elements, and prepare them for the support of the

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animal creation : a world, where (such is the infinite variety and number of the species) every thing is converted into a living substance, as it were, and where all second causes, every event, and every being, are, by eternal and immutable laws, rendered subservient to the production and preservation of life : where, if the species multiply, it is speedily to repair the losses to which their frailty exposes them ; if they destroy each other, if the term of their existence is confined to certain limits, it is to prevent their increase from becoming excessive. In a word, the grand object which the whole plan of nature has in view, is the plenitude and support of the animal system. There are general laws which impel every class of beings to promote this design ; and these laws are so intimately connected, that they are necessarily productive of each other.

It is alledged, that there are contradictions in the plan of Providence. But if the

the end proposed be such as we have represented, certainly she could not have chosen one more worthy of her; nor could she employ more efficacious means fully to accomplish this end, than those we have ascribed to her, and which are obvious to every one that contemplates her works. In which then do these contradictions consist? If there is a contradiction in the animal system, it is centered in man, to whom God has given understanding to know, reason to discern, and a heart to love the truth, though he turns from her every time she appears before him: it is, that those who are appointed by divine and human laws, to apply themselves to investigate the truth, and advance her interest, should keep her prisoner, and never shew her to the public, but through the bars of hypocrisy and dissimulation, as if she were a haughty and destructive tyrant: it is, that there are men mild, affable, benignant in their dispositions, that will pardon guilt, but are

implacable to those who dare shew them the truth. These are contradictions that embarrass us, or we should find nothing in the animal system but subjects for admiration and gratitude.

Many have undertaken to explain the origin of physical evil in the world, and it is acknowledged they have treated this subject with much perspicuity, penetration and care; yet after all, the principal question remains unresolved, which is, to reconcile certain appearances in nature, with our ideas of infinite wisdom and goodness. Discussions of this kind are like calculations in algebra or arithmetic; a mistake in the denomination of a single term will always render the conclusion false, however just the reasonings may otherways be upon which this conclusion is founded. Without attending to the general good resulting from a certain arrangement in the animal system, they have called that evil which is not so: and

as they have thought themselves warranted to assert, that a being supremely excellent cannot be the author of evil, they have taken infinite pains to reconcile its introduction into the world with the perfections of the Divine Nature. But instead of removing, they have only increased the difficulties. Some have imagined two principles, the one good, the other evil; others, which amounts to the same, have supposed that those rebellious and daring spirits the Scriptures represent as bound in chains of darkness, still retain sufficient power in the world to trouble its repose, in spite of Omnipotence. Others again, unwilling to deprive the Deity of the glory of governing the world alone, have represented him as a powerful, absolute Being indeed, but deficient in mercy, penetration, and uniformity of conduct: as a Being that was disappointed of his end in the creation of the world, and therefore determined to curse it, and subject it to an infinitude of evils.

evils. Others have thought to justify the Creator, by laying the whole blame upon his creatures, not considering that, according to their own sentiments, all things are from him, by him, and to him. All these absurdities demonstrate how necessary it is to study nature in the book of nature itself; and to form our judgment of beings, and of things, upon the ends and relations which are observable in nature, and upon these alone.



F I N I S.